Gas Journal

JUNE 30, 1937

Vol. 218 89th Year No. 3867

Editorial Notes

An Interesting Prophecy

A CONTRIBUTOR to our columns last week, while appreciating what has been done and is being done to produce better gas-consuming appliances of higher thermal efficiencies, asked what steps the Industry is taking to place the combustion process itself on a sound, satisfactory, and scientific basis, maintaining that this is the bedrock of our business. He urged re-examination of the principles of gas burner design and the mechanism of combustion and exhaustive investigation into the use of catalysts to promote combustion in domestic appliances. The approach to the matter should not be too academic; science and practice must go hand in hand. This subject of the combustion characteristics of gas was, of course, a major theme of discussion at the Annual Meeting of The Institution of Gas Engineers, and, as all are well aware, the Joint Committee of the Institution and Leeds University is at the moment busily engaged on the problem. At the meeting Mr. E. V. Evans, who is Chairman of the Committee, foreshadowed " interesting developments " in connection with this work; and, like the Author of the article to which we have referred, we look forward with expectancy to the information which will be disclosed at the Autumn Research Meeting of the Institution next November.

Certain it is that no problem was more fitting for planned investigation by the Institution than that of the gaseous combustion process, but at a time when the Industry as a body appears to have awakened to the need for such work full recognition should be given to and full use made of past researches. We are by no means starting *de novo*. The results of past investigations should be studied in the light of their application to changed conditions, and particularly should we seek the closest co-operation of the manufacturers of appliances, who, in their own interests and in those of the Industry of which they form part, have spent an enormous amount of time and energy in elucidating the problem and linking up the work with the practical development of burners and appliances, both domestic and industrial. It is in this connection that we refer to the pertinent observations of Mr. H. James Yates at the Institution meeting. He established Research Laboratories to study this and other questions over 40 years ago, and is naturally in a position of authority to speak about the matter. " In the development of all new things," he said, " much spadework has to be done and frequently the high ideals at which we aim do not always prove to be practical or commercial propositions." The research spadework for which he has been responsible, however, has enormously benefited the Gas Industry. This, of course, is generally recognized. The modifications in the design of burners and injectors, for example, required to eliminate noise necessitated research extending over a number of years; the absence of noise in the case of gas fires is now taken for granted. Then one has only to consider the investigation of the factors which determine complete combustion of gas used in all types of domestic gas apparatus to realize the value of such work in the development of gas appliances as we know them to-day. The perfection of the " Regulo," again naturally necessitating the carrying out of much research, literally revolutionized gas cooking and gave to gas a very real advantage, altogether apart from cost, over its competitors. So we could go on, but our point in mentioning these advances and the research which made them possible is to emphasize the need for co-operation in future work, for the manufacturers must have in their possession the results of fundamental research which, for one reason or another, has not yet found practical application.

As we have said, we look forward with expectancy to the information to be disclosed at next November's Institution meeting. And in view of the remarks of Mr. Yates at the June meeting we look forward, too, with the liveliest interest to a new development in gas heating appliances. Speaking of gas fires Mr. Yates mentioned that the first columnar radiant was put on the market nearly 30 years ago. Since that date this type of radiant has —again as a result of continuous research—been vastly improved. This improvement, coupled with other developments in the design and construction of fires, has resulted in the modern gas fire with a radiant efficiency double that of the pre-1908 fire. However, for long Mr. Yates has felt that the radiant must go; and he has now made the definite prophecy that the radiant as we now know it *will* go, " so enabling gas fires of an entirely new design to be offered to the public." Mr. Yates is not a man to talk airily on a development such as this for which he has been instrumental. Widespread interest has been aroused by his observations at the Institution meeting, and we may be assured that the new appliance will, as it were, have gone through its ordeal by fire before it is placed before the Gas Industry and the buying public. One has only to consider the discredit brought upon gas heating by the appearance of fires—often in public rooms, such as waiting rooms—with broken and discoloured radiants to appreciate the advantages of a fire for which

radiants were not needed. There is, too, another aspect of the matter, and an important one. Maintenance is necessary to preserve the appearance and proper working of the gas fire. We are advocates of such maintenance, but it costs money; obviously any development which would minimize the need for maintenance would be all to the good and would be a step in the right direction from the consumer's point of view. One of the chief merits of the present gas fire is, of course, its ability to heat up quickly, but we feel sure that Mr. Yates will not be prepared to sacrifice this quick generation of radiant heat in his new gas heating appliance.

Flexibility in Heating

Before Mr. Yates had made his prophetic announcement concerning such a radical change in gas fire design, Mr. Masterman had expressed in his Institution Paper the opinion that at all events gas fires in the future would require that reduced gas rate and reduced heat input to the room should not prejudice the appearance of the radiants. Since the bright appearance of the gas fire as we now know it depends not on the total heat output but on the incandescence of small points of refractory within the radiant, this flexibility in heat output without substantial change in appearance can theoretically be obtained and would, he assured us, shortly be commercially available. Such a development would enable a single size of fire to be used in a wider variety of situations than has hitherto been possible. Another point which causes trouble and besides spoiling the appearance of the fire may interfere with combustion is the vulnerability of the present radiant to breakage; and, said Mr. Masterman, again of course having in mind the present type of fire, in due time unbreakable radiants would be developed of acceptable appearance when cold. Also, devices might be introduced to enable the user to vary the distribution of radiant heat at will. Like ourselves, he sets store by small independent flueless heaters for background heating. We referred to this matter last week in pointing to the great need for eliminating as far as possible the sulphur compounds from gas. Small inconspicuous flueless heating units, perhaps positioned near the windows, could be employed without any hygienic disadvantage and at a lower cost than coal for raising the temperature of the air a few degrees. The gas fire could then be used as an additional and cheerful source of radiant heat while at the same time affording ventilation. There is also scope for small radiant heaters positioned several feet above the floor, the heat being directed downwards.

In regard to the design of gas cookers there is unquestionably need for a greater measure of automatic ignition. Reliable automatic ignition is bound to come, and we are glad to see the considerable amount of work which is being done in this direction at the present time both in the laboratories of gas undertakings and by the manufacturers of equipment. Work in progress, too, points to much improvement in the grilling operation. The use of light metal frets is recent, but the study already made—and much more investigation is required—on these frets of heat resisting metal and the correct relation between fret and flame has made possible quicker heating up and more adequate grilling. Further improvements will certainly accrue from this work. Then we have no doubt that the initial heating up period of the oven will be reduced as will also, by improved lagging, the heat losses from the oven. The progress made in this respect constitutes another example of the value of the research undertaken by the appliance manufacturers supplemented by research by gas undertakings.

The Industry's Finances

There are many milestones to remind one of the passing of the years. Some of them may be unwelcome, but this cannot be said of the annual Board of Trade Return relating to all authorized gas undertakings in Great Britain, which appears in two separate parts round about the same times of each year. The reason why these statistics could not very well prove unwelcome is that, though they do mark the passing of another year, they unfailingly register, at the same time, further steps in the progress of the Gas Industry. It is the fact that in this case the milestones are belated in point of time; nevertheless we come upon them at about twelvemonthly intervals, so that the belatedness, regrettable though it may be from some aspects, does not detract from the value of the statistics as milestones. As a matter of fact, the figures now before us—comprised in Part II., which deals with finances and prices—relate to the year 1935 only, and so, except for the gas administrator, must have lost a good proportion of the power to interest which they might earlier have possessed. To be strictly accurate, it should be stated that, though the figures are for the year 1935 in the case of companies, they do carry us a trifle further in connection with undertakings in England and Wales in the hands of local authorities—that is to say, to March 31, 1936—though for Scottish municipal concerns the figures bring us down no later than to May 15, 1935.

The operations of the authorized gas undertakings in Great Britain during the year 1935, as shown by the Return (which is obtainable at H.M. Stationery Office, or through any bookseller, at the price of 10s. 6d. net, postage extra), would appear to have been satisfactory, inasmuch as receipts, expenditure, and gross profit were all increased. On the present occasion, the number of undertakings included is 716, which is seven fewer than in the previous year. The reduction has been from 412 to 408 in the case of companies, and from 311 to 308 for the local authorities. The comparative table which, as usual, accompanies the Return, shows that since 1920 the number of authorized company undertakings included has been reduced from 494 to the present figure of 408, while over the same period the number of municipally-owned concerns has increased by only four to 308. Amalgamation and acquisition must be the main explanation for the shrinkage in the list of companies. Generally speaking, the reduction is fairly evenly "stepped" over the fifteen years, with the exception of the three years 1929-1932, when the total fell from 452 to 419.

But inasmuch as any falling-off there may have been in the number of companies does not represent any lessening of business opportunities—in fact, in many cases quite the reverse—the figures of gross profit continue to increase. The widening of the difference between receipts and expenditure on revenue account which was noticeable in the previous year continued in 1935, and at a more satisfactory rate. In 1934, the paid-up share capital of the 412 companies was £95,304,807, and the issued loan capital £39,970,536, the revenue account figures being: Receipts, £44,298,829; expenditure, £37,013,510; and profit, £7,285,319. By the close of 1935, the paid-up share capital of the 408 companies embraced in the Return had become £96,221,711, and the issued loan capital £43,877,559, the revenue account figures being: Receipts,

£45,029,940; expenditure, £37,508,247; and profit, £7,521,693. As in the previous year, we have for 1935 an increase of nearly a million pounds in the paid-up share capital with a much greater increase (almost four million pounds) in the loan capital issued. On the other side, the growth of profit, which growth in 1934 was only £62,056, is on the present occasion £236,374.

When one comes to the undertakings owned by local authorities, the figures are, of course, to a large extent influenced by the operation of the sinking fund, which automatically reduces the outstanding capital, while the fact that considerations of profit are not the same as in the case of companies also tends to vitiate comparisons. The table in the Return shows that the total amount of money borrowed by the 311 municipal undertakings in 1934-35 stood at £79,421,964, and the amount repaid and balance in sinking fund at £51,800,112. The corresponding figures for 1935-36 are £80,558,245 and £53,747,376, for the 308 undertakings included. As was the case a year ago, these figures show a decrease during 1935-36 of round about a million pounds in the amount of loans outstanding. Comparing the two years, the receipts on revenue account increased from £21,014,933 to £21,607,015, while at the same time the expenditure rose from £17,067,905 to £17,579,561. Once again there is a falling-off in the grouped item of interest charges and amount of loans repaid, the result being a net profit for 1935-36 of £798,778, which compares with £648,190 for 1934-35.

At the date of the latest Return the aggregate amount of the issued capital (share and stock, including premiums paid in respect thereof) and issued loan capital of the companies, and of money borrowed by local authorities (including loans borrowed and since repaid) was £220,657,515. The receipts of both classes of undertakings on revenue account were £66,636,955, and the expenditure £55,087,808, leaving a gross profit of £11,549,147. The receipts and expenditure exceeded the figures of the preceding year by £1,323,193 and £1,006,393 respectively, the gross profit being accordingly increased by £316,800.

When the tale of 1936 comes to be told, by the issue of the next Return, still further progress will fall to be recorded, though rising costs must be expected to leave their mark. Meanwhile, it may be pointed out once again that the Return affords a vast amount of information to gas administrators through the columns devoted to gas prices and meter rents charged. To show the extent to which undertakings are offering special prices for large quantities of gas, the respective prices charged for annual consumptions of 100, 500, and 5,000 therms are shown, where this information is available.

Gas Appliance Prices

THE British business character is so cast that as a nation we can deal successfully with almost any given set of circumstances, and that we can adjust ourselves in the end to almost any factor, favourable or otherwise, with which we have to contend. But such adjustment is not usually a rapid process, and it is perhaps mainly for this reason that British Business regards a state of uncertainty as one of the most unfavourable, even if most common, features of this post-war period.

Two announcements of general increases in the wholesale prices of gas appliances, one in December last and another in April, cannot have been regarded by the Gas Industry as in any way favourable factors, either by the appliance manufacturers who had to make them, or by the gas undertakings who deal directly in the matter with the public. But increases of this kind were accepted as inevitable, and the smoothness with which the necessary adjustments were made can be judged by the almost complete absence of adverse comment by the section of the Industry chiefly affected. It is, however, generally recognized that costs have continued to rise since the last advance in prices was notified in April, and the future position regarding raw materials and wages remains difficult and obscure. It is therefore a matter upon which the Industry can heartily congratulate itself that the section of itself which provides gas consuming appliances has been able to set a term to uncertainty by means of the announcement which we reproduce in other columns this week.

It is a statesmanlike action on the part of the makers to take the risk of guaranteeing stabilization for at any rate six months ahead. Before making this statement we have taken the precaution of enquiring in responsible quarters what precisely is the significance of the proviso concerning "unforeseen serious increases." We are satisfied that it visualizes only such circumstances as would constitute a national crisis in which current values would, as a matter of course, go by the board, and that, barring any such calamity, the makers' offer of stabilization can be accepted absolutely at its face value. Our enquiries extended equally to the question of "prices ruling on July 1 next," and on this matter, too, the makers are offering the square deal which one would expect of them, and actually the prices ruling on that date will be the same as those on which all recent contracts have been negotiated.

Nothing can be of more value for the continued prosperity of the Gas Industry than a mutual appreciation of one another's problems by the makers of plant and appliances and the gas undertakings. We regard the present move on the part of the former as a genuine effort to serve the whole Industry, and there will be general agreement to do all possible to minimize for them the risk they are undoubtedly taking in the good cause. It can, we are sure, be taken for granted that the gas undertakings will pass on to their consumers the full benefit of this gesture by the makers. In other words, while they must naturally cover themselves against the extra cost involved in the two recent rises, this is no occasion upon which to seek an additional margin of profit on sales of appliances. Let us concentrate rather upon the additional sales of gas which the appliances will bring.

Trade Effluents

THE Water Pollution Research Board has presented its Report for the year ended June 30, 1936.

The Board is of the opinion that unless satisfactory methods of treatment and disposal of sewage and industrial effluent are adopted to a far greater extent than hitherto there will be considerable difficulty in the future in providing the large volumes of water of good chemical and bacteriological quality necessary for domestic, agricultural, and recreational purposes.

It calls attention to the fact that the Joint Advisory Committee of the Ministry of Health and the Ministry of Agriculture and Fisheries, in their Report in 1930, recommended that local sanitary authorities should be under a general obligation, subject to certain conditions, to receive and dispose of the industrial effluent of their districts, and that traders should have a corresponding right to discharge such effluent into the public sewers. As

our readers are aware, the Government have now introduced a Bill to effect this purpose, and it is satisfactory to know that the Bill has met with such a large measure of support in the House of Commons.

The Report refers in high terms of commendation to the "useful investigations" carried on by the Liquor Effluents and Ammonia Committee of The Institution of Gas Engineers with regard to the methods of treatment and disposal of liquor effluent from gas-works and of recovery of ammonia from crude coal gas.

There is still a large number of districts in which sewage is not biologically purified, but is discharged, either crude or after only simple sedimentation, into the sea, into estuaries, or into large rivers. The experiments of the Institution Liquor Effluents Committee have demonstrated that, if the dilution available is so great that the discharge of untreated sewage alone has no appreciable detrimental effect on the water of the river, no undue reduction in the concentration of dissolved oxygen in the water is likely to be caused by the presence of 0·5% of gas-works effluent in the sewage. The toxic effect of such effluent on fish life, however, is a matter which requires consideration.

Reference is also made to the experiments at the sewage disposal works at Leamington Spa where sewage is purified by sedimentation, followed by biological oxidation in percolating filters. "In these experiments," the Report states, "the biochemical oxygen demands of the final effluent were 0·59 part per 100,000 with sewage alone, 0·92 part with sewage and spent liquor, and 1·38 parts with sewage and crude ammoniacal liquor. Although the final effluents from mixtures of sewage and gas-works effluents were not so good as from sewage alone, they were of satisfactory quality."

It is gratifying to note that the Water Pollution Research Board pays such high tribute to the work which the Gas Industry is carrying out, through the Effluents Committee of the Institution, in connection with a subject the importance of which is becoming increasingly appreciated by the public.

PERSONAL

Retirement of Mr. C. Dru Drury.

To-day marks the retirement of Mr. Charles Dru Drury after 57 years' association with the Gas Industry, the last 45 of which have been in the service of the Sunderland Gas Company.

Educated at private schools and Cheltenham College, Mr. Drury studied for several years under Prof. Henry Adams at the City of London College, obtaining numerous certificates from the City and Guilds of London Institute. In 1880 he became a pupil of Mr. P. J. Wates, who at that time was Engineer at the Vauxhall Works of the South Metropolitan Gas Company; five years later he was appointed Assistant to Mr. (now Dr.) Charles Carpenter, who succeeded Mr. Wates as Engineer at those Works. For seven years he served the South Metropolitan Company at Vauxhall, relinquishing his position in February, 1892, upon his appointment to take charge of the Hendon Works of the Sunderland Gas Company.

The death in November, 1909, of Mr. J. H. Cox, who for upwards of 60 years had been Secretary and Manager of the Sunderland Company, led to a re-arrangement of that Undertaking's staff whereby Mr. Drury became Engineer in charge of the two gas-works at Hendon and Ayres Quay. He was elected to a seat on the Board in January, 1929—a position he will still retain. In the following year he became a Member of the Institution of Civil Engineers. For the past few years he has acted in the capacity of Consulting Engineer to the Houghton-le-Spring District Gas Company. He is a Freeman of the Goldsmiths' Company of the City of London.

Mr. Drury has always taken the keenest interest in the activities of the Industry, having been President of the North of England Gas Managers' Association in 1898-99; but it is for his pioneer work at Sunderland that he will be chiefly remembered. During his residence there the Hendon Works were largely extended and modernized, and under his direction installations of both West's and De Brouwer stoking machinery were introduced into the horizontal retort houses many years ago. In addition, he was responsible for the entire reconstruction of the Company's Ayres Quay Works, trebling its productive capacity on an extremely difficult site. This work included the first installation of Dessau vertical retorts in the country, the original plant consisting of six beds of ten retorts each, which created considerable interest in the Industry at the time. He was awarded the Institution Gold Medal and also the H. E. Jones Medal for his Paper dealing with this subject read in 1911 before the Institution.

A host of friends in the Gas Industry will join with us in wishing Mr. Drury many years of happy and well-earned retirement.

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Mr. E. M. Ketteringham, who has for some years been engaged on the headquarters staff of Parkinson & Cowan, Ltd., has been appointed Commercial Manager of the Parkinson Stove Company, Ltd., with control of the sales side of the business. Mr. Ketteringham takes over his new duties on July 1.

* * *

Mr. A. C. Rea, Assistant Gas Engineer and Manager at Perth, has been recommended by the Gas Committee of Perth Town Council for the post of Engineer and Manager to the Department in succession to Mr. David Vass, who retires at the end of July. Mr. Rea's appointment is, of course, subject to the confirmation of the Town Council at its next meeting.

Mr. Rea in 1931 gained his diploma in Gas Engineering, and in 1936 his diploma in Gas Supply. He has taught gas subjects at the Perth Technical College and he is President of the Eastern District of the Scottish Junior Gas Association. For nine years Mr. Rea was with the Edinburgh Gas Department, going to Perth just over a year ago.

* * *

Mr. William John Shelley, Deputy Engineer and Manager of the Hinckley Urban District Council Gas Department, has been appointed Manager of the Thornton Cleveleys Urban District Council Gas Department. Mr. Shelley has held his present position at Hinckley since 1931.

Educated at Queen Mary's School, Walsall, Mr. Shelley entered the Walsall Gas Department as a junior and eventually became Chief Technical Assistant and Chemist. He studied at Walsall, South Staffs., and Birmingham Technical Colleges all branches of chemical, civil, and mechanical engineering. Since going to Hinckley he gained the Diploma and became an Associate Member of The Institution of Gas Engineers.

News in Brief

Owing to Increased Coal Prices, the Ayr Gas Company have raised the price of gas to all consumers by 2½d. per 1,000 cu.ft., as from the next reading of meters.

About 60 Pupils from Perth Academy on June 21 made a tour of the Perth Corporation Gas-Works. Mr. James Angus, Principal Master of Science, accompanied the party.

A Series of Cold Cookery Demonstrations was held by the Dundee Corporation Gas Department in the Gas Showrooms, Commercial Street, Dundee, from June 21 to June 25 inclusive.

Application to the Board of Trade for a Special Order under the Gas Undertakings Acts, 1920 to 1934, is intended to be made by the Bridport Gas Company with the object, among others, of enabling the Company to use certain lands for gas-works purposes.

With the Object *inter alia* of empowering the Company to purchase a bulk supply from the coke ovens of the Ocean Coal Company, Ltd., at Nine Mile Point, Bedwas, the Newport (Mon.) Gas Company gives notice that it intends applying to the Board of Trade for a Special Order under the Gas Undertakings Acts, 1920 to 1934. A further purpose of the Order is to fix a basic price for gas to be supplied by the Company and to make provision for the revision of such basic price.

To Meet the Increased Cost of Coal, the Droitwich Town Council have decided on the following increases in the price of gas: Ordinary consumers, 11·368d. (discount 10d. per 1,000 cu.ft.); over 200,000 cu.ft. per quarter, 11·368d. (discount 1s. 2d.). Power consumers, up to 30,000 cu.ft. per quarter, 10·947d. (discount 10d.); over 30,000 cu.ft. per quarter, 9·684d. (discount 10d.); over 200,000 cu.ft. per quarter, 9·263d. (discount 10d.). Slot consumers, (*a*) 19 cu.ft. per 1d., 11·08d.; (*b*) 18 cu.ft. per 1d., 11·964d.

The Centenary of the Bruton Gas Company is to be celebrated by the inauguration of a new gasholder. The Company was founded in 1837, and started operations with one holder of 5,000 cu.ft. capacity. There was only one main which lay along the High Street, but to-day, with the new gasholder of 40,000 cu.ft. capacity, the Company have a total storage capacity of 57,000 cu.ft. It is interesting to note the original tender for the Works was £1,094, and that the rules of the Company included a condition that lights had to be turned off within a quarter of an hour of the specified time, except on Saturdays, or consumers were subject to forfeiture of their lights.

A Gas Exhibition was held by the Houghton-le-Spring District Gas Company at the Miners' Hall, Robinson Street, from June 14 to June 18. Mr. G. W. Martin (Engineer and Manager) addressed the gathering and introduced Dr. Mary Crosthwaite, who conducted the opening ceremony. Miss E. Sanderson, 1st Class Diplomée N.T.S.C., Gold Medallist U.C.F.A., of Radiation Research Kitchen, used a "New World" gas cooker and gave 10 cookery demonstrations, assisted by Miss Fitzgerald, also of Radiation, Ltd. Miss Stott, of Messrs. W. H. Dean & Sons, Ltd., gave demonstrations of practical domestic laundry work. The Exhibition was a great success, 1,223 invitation cards being handed in, an average of 122 persons at each session. The sales of cookers, washing machines, &c., were very gratifying.

Prizes Amounting to £210 were presented this year by the Alliance and Dublin Consumers' Gas Company to the winners of their annual gas cookery competitions. This was the ninth year of the competitions and 45 schools took part. Each of the 466 prizewinners was presented with a certificate of proficiency in cooking and with a cheque ranging from £1 to 5s. The total number of competitors was 3,175. The Rt. Hon. James McMahon, presenting the prizes, mentioned that the forty-five schools included seven secondary, twenty national, and eighteen technical. The value of these gas cookery competitions in the schools would be appreciated, he said, when it was realized that gas cookery was employed in over 100,000 Dublin households to-day and that the home of the future would be more and more dependent upon it.

CURRENT EVENTS IN THE GAS INDUSTRY

Notice is Given by the Bodmin Gas Company that they intend applying to the Board of Trade for a Special Order under the Gas Undertakings Acts, 1920 to 1934, with the object *inter alia* of authorizing the Undertaking to supply gas in certain areas.

The Proposed Substitution of Gas for Electricity for the public lighting of Barwell was discussed at a recent meeting of the Hinckley Urban District Council. It was recommended the Gas Department finance the change and actual details in respect of the scheme be arranged in conjunction with the alteration and improvement of the public lighting in the whole of the Urban District.

Amalgamation and Grouping

United Kingdom and Ellesmere Port.

Recommendations regarding an offer for the purchase of the Council's Gas Undertaking by the United Kingdom Gas Corporation, Ltd., were submitted to the Ellesmere Port Council last week. After considering the recommendations in committee, the Council decided to refer them back to the Law and Parliamentary Committee.

The United Kingdom Corporation arrived at a valuation of £132,200 on the basis of accounts for the year ended March 31, 1936, and offered to pay that figure for the undertaking as a going concern.

United Kingdom and Hornsea.

An offer has been received from the United Kingdom Gas Corporation, Ltd., by the Hornsea Gas Company to purchase the shares of the Company.

The purchase consideration will be satisfied either in cash at £3 5s. per share or in 4½% second non-cumulative preference shares of £1, ranking for dividend as from Jan. 1 last, of the Corporation, or partly in cash or partly in shares.

Correspondence

United Kingdom Gas Corporation

SIR,—May I congratulate you on the very full and interesting account of the United Kingdom Gas Corporation which was published in your issue of June 16?

We have heard a great deal about holding companies from people on both sides of the fence, but as far as I know your survey was the first attempt to analyze the working of a holding company from an independent standpoint.

The "JOURNAL" has done a real service to the Industry by approaching this controversial subject in an impartial spirit and seeking to give plain facts uncoloured by prejudice.

Yours, &c.,
"X."

Alkali Attack on Silica Brick

SIR,—Reading over Dr. Foxwell's notes in your issue of June 9 regarding the attack of silica bricks by alkalis, one is disposed to wonder whether the "protective film" theory might not apply in the Irishman's way: Silica is rapidly attacked by alkalis in a liquid melt, but not by a gaseous phase. When much alumina, &c., are present, a very small combination of alkali gives rise to a fusible film in which further attack can proceed rapidly, whereas on a high-silica brick any products which may form are not liquid and therefore the attack ceases almost at once.

Yours, &c.,
G. H. CHEESMAN.

72, Wynash Gardens,
Carshalton, Surrey,
June 23, 1937.

The Institution of Gas Engineers

Change of Secretaryship

Mr. J. R. W. Alexander will relinquish the Secretaryship of The Institution of Gas Engineers to-day (June 30, 1937) and will be succeeded by Dr. W. T. K. Braunholtz to-morrow (July 1, 1937), on which day Mr. Alexander will take office as General Manager of Associated Gas and Water Undertakings, Ltd., and as General Manager of the East Surrey Gas Company.

Mr. Alexander's address will be 1, Brighton Road, Redhill, Surrey. Telephone—Redhill 666. Telegrams—Alexander, Sagacity, Redhill.

Presentation at Gas Industry House.

The Officers of the National Gas Organizations at Gas Industry House presented Mr. Alexander, on the occasion of his retirement from the position of Secretary of the Institution and as Joint Secretary of the British Gas Federation, with an inscribed coffee set and tray. The presentation was made by Col. S. S. Ogilvie on June 28, 1937, and acknowledged by Mr. Alexander, who said that no gift could be more appreciated than one from his closest colleagues, with whom he had worked in complete harmony for seven and a half years past.

Forthcoming Engagements

July.

1.—MIDLAND JUNIORS.—Visit to Buxton Gas-Works and the Silica Firebrick Company, Ltd.
2.—I.G.E.—Joint Committee on Complete Gasification under Pressure, Department of Scientific and Industrial Research, 16, Old Queen Street, S.W. 1, 3 p.m.
2.—MANCHESTER ASSOCIATION.—Meeting at Leeds, 11.15 a.m.; afternoon visit to the Yorkshire Copper Works, Hunslet.
6.—I.G.E.—Research Executive Committee, 2.30 p.m.
8.—I.G.E.—Meeting of Refractory Materials Joint Committee, Stoke-on-Trent, 2.30 p.m.
8.—S.B.G.I.—Council Meeting, 2.30 p.m.
9.—SOUTHERN ASSOCIATION.—Summer Meeting at Southampton.
12.—I.G.E.—Finance Committee, 1.45 p.m.; Membership Committee, 2.15 p.m.; General Purposes Committee, 3 p.m.; Benevolent Fund Committee of Management, 4.30 p.m.
13.—I.G.E.—Council, 10 a.m.
13.—N.G.C.—Central Executive Board Meeting, 2.30 p.m.
14.—B.C.G.A.—Executive Committee Meeting, 11.30 a.m.; General Committee Meeting, 2.30 p.m.
15.—I.G.E.—Gasholder Committee, 2.30 p.m.
20.—I.G.E.—Gas Education Executive Committee, 11 a.m.; Gas Education Committee, 2.30 p.m.
21.—I.G.E.—Gas Examination Results Published.
23.—I.G.E.—Liquor Effluents and Ammonia Committee, 11.15 a.m.; Joint Research Committee, 2.30 p.m.
28.—I.G.E.—Pipes Committee, 2.30 p.m.

Summer Cookery Demonstrations

South Metropolitan Company's Co-operative Effort

An interesting week's activities have been planned at Messrs. Holdron's, Ltd., of Peckham, by that enterprising firm in co-operation with United Dairies, Ltd., and the South Metropolitan Gas Company from July 5 to 10.

Special summer cookery demonstrations are to be given by the United Dairies Cookery Expert each day, at which free printed recipes will be distributed. In connection with these demonstrations a recipe competition is to be held, prizes being awarded for the best recipe, in which milk is the principal ingredient, handed in at any of the sessions. Then, of course, there will be a cake-making competition, the chief provision being that all entries shall be cooked in a gas oven.

For school children there is to be an Essay Competition, one of the optional subjects being "How Gas Appliances Help Mother at Home." Three prizes for entries on this subject will be given by the South Metropolitan Gas Company. Finally, a Bonny Babies Championship divided into three classes according to age, for which a cup will be presented by United Dairies, Ltd., and further prizes by the other firms.

All the prizes in the various competitions are on view at Messrs. Holdron's, and among them are many useful appliances generously presented by the South Metropolitan Gas Company.

No Further Advance in Appliance Costs

Manufacturers' Announcement

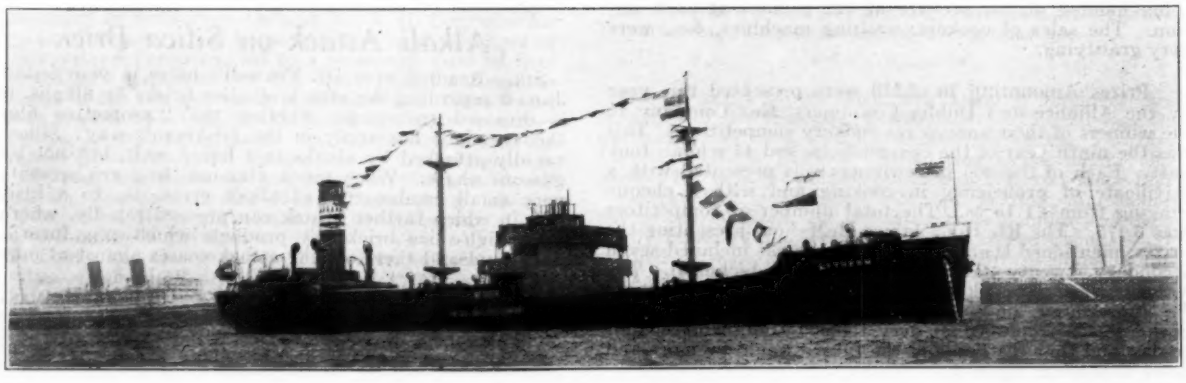
Under date of June 24 the undersigned gas appliance manufacturers announce that although costs have risen considerably since the advance in prices was notified in April last, and the future position regarding wages and prices of raw materials still remains difficult and obscure, manufacturers fully appreciate how very important it is, in the best interests of the Industry, for prices to be stabilized as far as possible.

After full consideration, the undersigned manufacturers have pleasure in intimating that, apart from the advances already notified in December and April last, they do not propose to make any further general advances before the end of the current year, unless unforeseen serious increases in costs render such a course unavoidable.

In the meantime, they are prepared to deliver until the end of the year at the prics ruling on July 1 next. In a few cases unremunerative prices may, however, be revised and notice will be given in regard to these.

Arden Hill & Co.
Bratt Colbran, Ltd.
Cannon Iron Foundries, Ltd.
Carron Company (Gas Appliances only)
Clarks Stove Company, Ltd.
Davis Gas Stove Company, Ltd.
Emscote Foundry Company, Ltd.
Falk, Stadelmann, & Co., Ltd.
Sidney Flavel & Co., Ltd.
Forth and Clyde and Sunnyside Iron Companies, Ltd.
Fletcher, Russell & Co., Ltd.
General Gas Appliances, Ltd.
John Harper & Co., Ltd.
R. & A. Main, Ltd.
Parkinson Stove Company, Ltd.
Richmonds Gas Stove Company, Ltd.
R. Russell & Sons, Ltd.
Stoves, Ltd.
Vulcan Stove Company, Ltd.
Wilsons & Mathiesons, Ltd.
John Wright & Co , Ltd.

"Mr. Therm," one of the Gas Light and Coke Company's Colliers, at the Naval Review



Gas at the Highland and Agricultural Show

A comprehensive gas display was arranged at the Annual Show of the Highland and Agricultural Society of Scotland, which was held at Alloa from June 22 to 25 inclusive. This Show—the largest of its kind North of the Tweed—was visited by thousands of people from all parts of the British Isles.

The gas exhibit measured 100 ft. by 20 ft., and was organized by the British Commercial Gas Association in conjunction with the Alloa Corporation Gas Department. The Stand includes a demonstration hall, kitchen, bathroom, &c.

All official caterers used gas for cooking and water heating. There were 42 boiler rings, 45 cookers, and 42 water boilers installed throughout the Show. Other stands used gas for refrigeration and lighting. These figures are in addition to the appliances on the B.C.G.A. Stand. It is also interesting to note that 2½ miles of pipes were laid in the showyard by Alloa Gas Department. The Alloa Gas Department co-operated with the Highland and Agricultural Society to the fullest extent, and Mr. J. W. Napier, Engineer and Manager, has been personally congratulated by the Society.

Another interesting exhibit was that of Drying Grass, especially in view of the fact that this question has been receiving a great deal of publicity recently in the Scottish National Press. A model of a Curtis Semi-Producer Furnace was on view, and a number of bales of dried grass for exhibition were kindly supplied by Sir James Roberts, of Strathallan Castle, Auchterarder. All relative literature was supplied by the London and Counties Coke Association. A large number of enquiries were received in connection with this exhibit; in particular, one from New Zealand. It is also of interest to note, in this connection, that a mobile grass drier was exhibited in another part of the Show.

British Commercial Gas Association

Scottish Conference at Peebles

A Scottish District Conference of the B.C.G.A. was held at the Peebles Hydro Hotel on June 25, when Mr. John Fergusson (Provost of the Royal Burgh of Peebles) presided over a representative gathering.

Following a civic welcome, an Address was given by Mr. William Ross Young, F.S.I., M.T.P.I., of the Department of Health for Scotland, on "Town and Country Planning."

At the subsequent luncheon, given to the delegates of the Conference by the Provost, Magistrates, and Town Council of Peebles, the toast of "The Town and Trade of Peebles" was proposed by Provost CURLE, of Melrose.

Provost FERGUSSON, replying, said that during the last fifteen years the consumption of gas had increased by 31%, although the number of consumers had only increased by 300. They had 2,100 consumers of whom 1,800 used prepayment meters. For the latter there was no extra charge and gas was sold at 3s. 9d. per 1,000 cu.ft. Free cookers had been supplied for over thirty years, but an increasing number of new cookers were being sold, the obsolete ones being brought in and scrapped.

The toast of "The Gas Industry" was proposed by Ex-Provost FORRESTER, who said that over sixty years ago as a boy he was an eager stoker in the little gas-works in the village where he was brought up, and he was appointed Convener of Peebles Gas Committee some twenty years ago. He congratulated the Industry on the appointment of Mr. W. R. Drummond as Residential Secretary of the National Gas Organizations of Scotland.

In replying, Councillor WALTER MUTER (Edinburgh) said that the Gas Industry had surmounted many of the post-war difficulties that confronted it, and that had been done merely because of the cohesive effort of the Industry as a whole. "That is why," he added, "I am glad that the Toast has taken the form of a reference to the British Commercial Gas Association, because that is the veritable spearhead of the work of the Gas Industry."

Continuing, he said that within the last year or two the Industry had had to face a real and vital problem. He referred to the action of His Majesty's Government, the Government of 1930 and the succeeding Governments, in relation to the coal industry. "We are faced to-day," he said, "with a set of circumstances that is without parallel in the whole field of British industry. We have created under the Act of 1930 a virtual monopoly that is placed in the hands of the coalowners and coalmasters. A week or two ago, when the representatives of the Gas Industry on the Scottish District Joint Consultative (Gas Coal) Committee met the Scottish coalowners they were faced with blank refusal to discuss prices."

"The B.C.G.A.," said Councillor Muter, "as the spearhead of our commercial endeavour, is worthy of your fullest support. Let there be no mistake in this; it is not something remote situated in London; it is something live and real, in daily and active contact with our great Industry throughout the country."

After lunch a discussion was introduced by Mr. A. B. Munro (Sales Superintendent of the Edinburgh Corporation Gas Department) on the subject of "Should Gas Undertakings Subsidize Water Heating Installations?" A Ladies' Session was held concurrently in the Chambers Town Hall, at which Mrs. Eileen Murphy addressed the gathering on "Home-Making—American and British."

A Prize-Winning Carnival Display

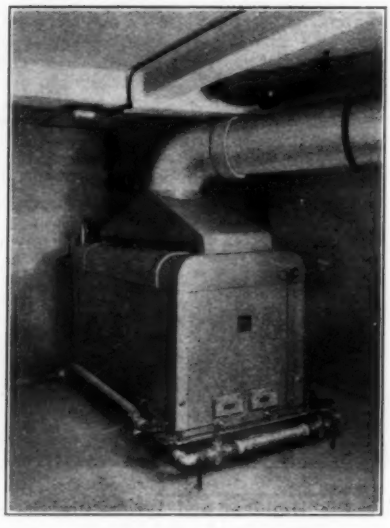
This attractive display of "Ascot" products shown by the Pudsey Gas Company attracted much attention in the recent carnival procession and, for the second year in succession, carried off the first prize in the Commercial Class.

GAS SOLVES THE PROBLEM

OF

Warming Private Swimming Pool

An Interesting Potterton Installation at Highgate



The "Rex" Boiler which looks after the warming of the Pool.

When one thinks of the applications of gas in the Borough of St. Pancras, one may instinctively visualize its uses in rather drab commercial buildings, in rows of ancient tenement houses, in stereotyped Victorian squares, or in blocks of working-class flats. This is, of course, because one does not know St. Pancras except by its inevitable association with smoky railway stations, with grim and forbidding warehouses, and with other buildings of the type to which we have referred. It is not generally appreciated that its farther boundaries embrace some of the most beautiful country within the greater London area. To suggest that wild rabbits can be shot or that nesting pheasants may be found (if one knows where to look for them) in their natural surroundings within the confines of the Borough would usually be greeted with ribald comment or thinly veiled incredulity, according to the temper of one's audience.

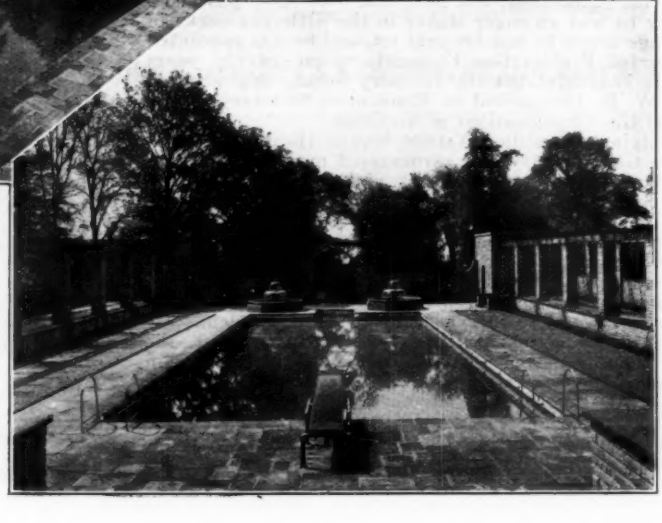
It is, nevertheless, a fact—as was brought home to us in complete reality not long ago when we were privileged to inspect another application of gas, in the warming of the recently completed swimming pool on the magnificent 10-acre estate of Mr. Oswald Lewis, M.P., at "Beechwood," Highgate.

It is impossible to give adequate expression to the beauty of this woodland site, with its stately mansion, its graceful trees and gently sloping lawns, its rhododendron walks and charmingly laid-out flower beds, its picturesque sunken rock garden and placid lily-pond, or to its glorious vista over Ken Wood towards the green slopes of Parliament Hill. Such, then, is the setting for what must undoubtedly be one of the finest private swimming pools in the country; nestling among the trees, this masterpiece of graceful symmetry (designed by Messrs. Wimperis, Simpson, & Guthrie, of 61, South Molton Street, London, W. 1) is, perhaps, the crowning glory of an estate on which no pains have been spared to evolve a garden—if so lovely a place can be called by such a mundane term—that provides an enchanting spectacle to all who view it.

The accompanying photographs give a more vivid impression of the charming design of the swimming pool than any words could achieve and, moreover, make it clear that gas—and only gas—could perform the none too easy task of maintaining nearly a hundred thousand gallons of water at around the 70° mark during all the vagaries of the British summer. Early consideration of a coal-fired boiler was quickly abandoned when the effect of a smoking chimney upon such a site was visualized; nor was the question of regular attention to such a plant lost sight of in this connection. Thus we see gas once again playing its part in an application which has grown immeasurably in popularity during recent years.

Intended to be used from May to September, the pool is 75 ft. long by 30 ft. across, with a depth varying from 3 ft. at the shallow end to 8 ft. below the diving board. It holds 80,000 gall. of water.

The pool is surrounded on three sides by an artistic wall of natural coloured stone, with low parapets along the two sides adjoining the timber-covered arcades. Roses are trained up these walls as well as the pillars of the inner arcading, giving a lovely touch of colour, while honeysuckle creeps over the top. The face of the southern wall is broken by entrance gates of beautifully wrought iron, from which point there is a wonderful view down the length of the pool to the "pavilion" of quasi-oriental conception which dominates the farther end. At either side



Two photographs of Mr. Lewis' private swimming pool at Highgate, which give a good idea of its attractive lay out and beautiful setting.

of the steps which lead down to the water at the shallow end is a cascade of water falling into octagonal basins, providing not only the necessary aeration of the water as it passes from the filtration plant, but also that vivid impression of moving water which is so delightful a feature of all such pools. Flanking the stone pavement along either side of the water are smooth green lawns, while the stainless steel hand rails, shining tiles, and translucent blue of the water complete a picture which has to be seen to be fully believed.

Either side of the "pavilion" are lavishly equipped dressing rooms, complete with curtained cubicles, towel cupboards, and wringers for wet costumes. At the opposite end are two "towers," one at each corner of the wall, which house, on the one side, the various articles required for the upkeep and maintenance of the pool and its immediate surroundings (including the portable suction apparatus which is used for clearing leaves and other foreign substances from the bottom of the pool), and on the other the filtration plant and circulation pumps. A second chamber has been constructed underneath that occupied by the filtration plant; and in this, entered by a flight of steps from outside, is the Potterton gas boiler illustrated in the accompanying photograph.

The Boiler Plant.

The gas boiler is a No. 3 series "Rex" of eight sections, having an output of 1,000,000 B.Th.U. per hour, so that the temperature of the water can be raised very quickly when necessary, while at other times the thermostatic control just maintains the required temperature.

The boiler is coupled into the pipe line of the filtration plant in the standard manner with a valved by-pass that can be adjusted to pass the necessary volume of water through the boiler, to give the desired temperature in the delivery after re-mixing, the gas being thermostatically controlled to raise the water passed through to 105° F. At this temperature "Rex" boilers are free from condensation within the flue-ways so that maintenance costs are reduced to a minimum and the highest overall efficiency is obtained.

The pumping set has a capacity of 6,600 gall. per hour under normal working conditions, though it is capable of working up to 8,000 gall. per hour if called upon to do so. The delivery from the plant to the pool is through the two cascades when required for aeration or to enhance the charm of the surroundings, but when the water is being first raised to the required temperature or is being heated without the need for aeration, then a valve is provided to pass the water directly to the pool. When pumping in this way the high lift over the cascades is reduced, and the contents of the pool is circulated in about six hours, during which time a temperature rise of 7½° F. is given to the whole content. Provision is thus made for quick heating should the pool be used intermittently.

The filtration plant is of Messrs. Patterson's manufacture, and the gas boiler was installed by Messrs. Rosser & Russell, Ltd.

Gas *versus* Oil for Power Purposes

Interesting Discussion at Truro

A novel feature of a meeting of the Cornwall Federation of Chambers of Commerce and Traders' Associations at Truro on June 16 was a contest between advocates of crude oil and of gas for power purposes.

The case for gas was put by Mr. W. A. Tookey, who mentioned that gas was first made in Cornwall, and that gas had been supplying Cornwall ever since, as well as huge industries in other parts, without stoppage. He referred to the stability in gas rates, and pointed out to his hearers that despite the very large increase in generation of electricity the cost of distribution was decreased to the extent of only one-hundredth of a penny and the cost of management to the extent of only one-thousandth of a penny per unit. He claimed that the gas engine could give equal, if not better, service. It was the father of the oil engine and the godfather of the electricity industry. With regard to the oil engine's safeguard against a general stoppage such as was not unknown in electricity distribution, the Gas Industry could at least give an equal assurance, because in Cornwall and throughout the country gas companies had never once interrupted their supplies, even in war-time. Gas was available whenever they wanted it, and it eliminated all storage problems. Its price stability enabled power costs to be accurately estimated. The gas engine had stood for many years, and was still standing, in an important position in the power units of the country. Every gas company in the kingdom would give a balance-sheet, not of hypothetical figures, but figures by which they would stand, and they would supply straightforward information and offer honest dealing.

The Federation arranged the meeting in order that power users in the county, and potential users, might learn something to their advantage regarding the use of power at very low cost.

In This Week's "JOURNAL" - - -

New Carbonizing Plant for St. Helens.

We publish a description of the growth and development of the St. Helens Corporation Gas Department and its existing carbonizing plant, together with reference to the recently added installation of Glover-West verticals and ancillary handling plant, which incorporate all the latest improvements in the details of the retorts and of the heating system, the plant having yielded excellent results in operation, while its guarantees have been comfortably fulfilled.

See p. 986.

Electrolysis.

Damage to gas mains and services caused by the destructive action of vagabond electric currents was the subject of a British Paper at the International Gas Conference. In this the Author, Mr. H. C. Widlake, observes that it is impossible to state even in approximate terms the annual loss which gas undertakings suffer by electrolytic damage to mains and services, but it is certain that such damage is far more prevalent than is generally believed. Mr. Widlake discusses means to minimize this electrolytic action.

See p. 1003.

Institution Discussions.

This, our Third Institution Number, contains the written contributions to the discussions on the Papers presented at the Annual Meeting of The Institution of Gas Engineers together with the Authors' replies. This concludes our report—and a very full report—of a meeting which, it is agreed on all sides, was eminently successful. The Papers and the discussions to which they gave rise provide ample evidence of the Gas Industry's new conception as to what should constitute consumer service. The modern public demands not gas but a thoroughly satisfactory heat service. It is obvious from the Institution meeting that this in its turn demands the closest co-operation between all concerned in affording this service —those on the works, those on the district, those engaged in selling, and those responsible for the training of personnel, those engaged on appliance development work and testing, and the manufacturers of gas making and gas using equipment. This co-operation will be forthcoming, and it will herald a new era for our Industry.

See p. 991.

Juniors' Summer Visit

Members of the Western and Wales and Monmouthshire Junior Gas Associations combined their Summer Meetings into a joint visit to London on June 26, when they were the guests of Ascot Gas Water Heaters, Ltd., at the latter's Neasden Works.

See p. 988.

City and Guilds Examination Questions.

Further questions which were set in the City and Guilds of London Institute Examinations in Gas Fitting are published.

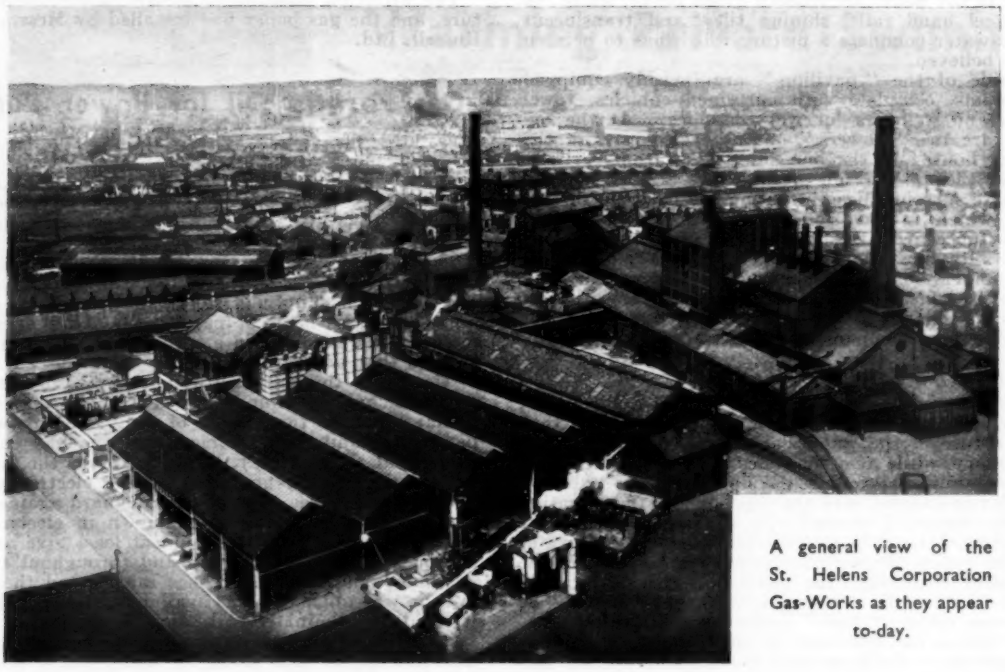
See p. 1007.

Board of Trade Enquiry.

On Friday, June 25, at the offices of the Board of Trade in London, Mr. J. F. Ronca (Director of Gas Administration) held an Enquiry into an application by the Stanley and District Gas Company for a Special Order under the Gas Undertakings Acts, 1920 to 1924, for the purpose of being converted into a statutory company.

See p. 1011.

New Carbonizing Plant for St. Helens



A general view of the St. Helens Corporation Gas-Works as they appear to-day.

A brief description of the growth and development of the St. Helens Corporation Gas Department and its existing carbonizing plant, with particular reference to the recently added installation of Glover-West verticals and ancillary handling plant.

Over a century ago the first gas-works in St. Helens was erected by the St. Helens Gas Light Company. The Corporation purchased the Undertaking in 1875, when the plant was capable of producing something over 500,000 cu.ft. of gas per day. In 1937, the Undertaking is in a position to maintain a daily output of 5 million cu.ft. of gas. The gas is distributed over a wide area through nearly 170 miles of mains to branches supplying 28,350 meters and over 3,000 public lamps.

In the old days before the Undertaking was bought by the Corporation, when gas was used only for lighting, the price was 10s. 6d. per 1,000 cu.ft. To-day, gas is sold in accordance with an attractive scale of charges graduated on a consumption basis from 7·79d. per therm (3s. 1d. per 1,000 cu.ft.) down to 4·64d. per therm (a little over 1s. 10d. per 1,000 cu.ft.), while special rates are allowed of 4·64d. per therm for all gas used for central heating, and 6·53d. per therm for gas used for gas engines. Consumers under special agreements are supplied with gas at a price as low as 3·75d. per therm (approximately 1s. 6d. per 1,000 cu.ft.), less 5% discount.

As will have been gathered from these few figures, improvements in the organization and equipment of the Undertaking have not failed to keep abreast of the increasing demand. In the course of the last few years a thoroughgoing scheme of extension and modernization has been carried out systematically at the gas-works, as a result of which the Undertaking is fully equipped to meet and to encourage continued and rapid increase in the use of gas for all purposes, industrial and domestic.

The works occupy a ground area of about 14½ acres. The carbonizing plant consists of two benches of continuous vertical retorts from which the gas flows in separate streams (which may, however, be interconnected, if circumstances require it). One stream is directed through the older ancillary plant and the other through the new units. After dry purification and metering, the gas streams unite and are washed for benzole extraction before passing to the gasholders.

The Earlier Carbonizing Plants.

It is impossible to mention carbonizing plant in connection with the St. Helens Gas-Works without recalling that here was the cradle of the Glover-West continuous vertical retort. It was at St. Helens in 1908 that Samuel Glover, at that time Engineer to the Gas Department, and John West, completed the first installation of the vertical retorts which have since won a world-wide reputation under their names. This first setting was of eight retorts 20 ft. long, each capable of a daily throughput of about 2½ tons of coal when making gas of a calorific value in the neighbourhood of 600 B.Th.U. per cu.ft., and an illuminating power of between 15 and 16 candles. The plant was erected under stringent guarantees to the St. Helens Gas Department in case of failure, but it almost immediately justified all the claims and all the expectations of its inventors, and after a number of tests by independent experts, was accepted by the Corporation without reserve. "At length," reads a brochure issued at this beginning of a new chapter in the history of the Industry, "the dream of continuous carbonization has been realized, and the hope of remote and more modern workers has been fulfilled."

In 1910 a further five settings of eight retorts were installed in a new retort house. The recent reconstruction has involved the dismantling of both this installation and the original one, though the retort house just mentioned has been utilized to house a coke-grading and storage plant.

The New Carbonizing Plant.

The new carbonizing plant occupies a portion of the ground space of the original horizontal retort house. It consists of 36 Glover-West 50 in.-56 in. retorts of the "New Model," arranged in units of four and in three groups of twelve. The settings incorporate all the latest improvements in the details of the retorts and of the heating system. There is an adequate provision of instruments for control purposes, and steam to the retorts is measured by a Kent steam meter.

The settings are served by a battery of four producers interconnected by a common flue. The producers are equipped in accordance with the most modern practice for the consumption of coke breeze. Each is operated by means of a West steam-jet air injector, and is controlled with the assistance of the usual thermometer indicating the temperature of the air-steam mixture, and of indicators which show the pressure conditions under the grate and in the producer-gas uptake flues.

This carbonizing plant has yielded excellent results in operation, and the guarantees have been comfortably fulfilled. A few average results for the first quarter of this year are given below. Lancashire coals from various collieries were used, for the most part washed nuts, with

analyses showing on the average, moisture 5·9%, ash 5·8%, and sulphur 1·9%.

Gas made per ton of coal carbonized . . .	16,585	cu.ft.
Calorific value (undebenzolized)	493	B.Th.U. per cu.ft.
Gaseous therms per ton of coal carbonized .	81·7	therms
Percentage of fuel to producers, by weight of coal carbonized	12·3%	

The producer fuel during this period consisted of a mixture of 65% breeze (below ¾ in.) and 35% coke (¾ in.-2 in.).

A Spencer-Bonecourt waste-heat boiler, capable of raising in normal circumstances 12,500 lb. of steam per hour at a pressure of 120 lb. per sq.in. with 100° F. of superheat, is arranged to work in conjunction with the new carbonizing plant. The induced draught fan on the boiler is operated by a steam turbine. The exhaust steam from this turbine is used for heating purposes in a water-softening plant.

Handling Plant.

Coal is brought to the retort house in railway wagons by one of the two works locomotives. The wagons are emptied by means of a West side-discharge wagon tippler. The coal is fed mechanically from the receiving hopper of the tippler into a West single-roll coal breaker, capable of dealing with 50 tons per hour, in which it is reduced to a maximum size of 2 in. cube. The broken coal is then elevated by a West lip-bucket conveyor to a push-plate conveyor which distributes it to the coal-storage bunkers above the settings. The bunkers have a capacity of 48 hours' supply of coal to the retorts.

Coke discharged from the retort mouthpieces is directed on to a rubber band conveyor, 30 in. wide, by a travelling chute. At the extremity of the old retort house the band discharges into a lip-bucket conveyor which encircles a night storage hopper. The lip-bucket conveyor elevates the coke and may discharge it direct on to another band conveyor for transport to the coke graders, or it may deliver it to the night storage hopper, or in an emergency to a storage heap in the yard. From the night storage hopper the coke is again fed on to the lip-bucket conveyor at some convenient time when the grading plant is working.

The coke-grading and storage plant is housed in the retort house of the 1910 vertical retort installation, which was dismantled when the new installation was completed.

The coke is graded into four sizes by a set of West coke graders. The storage hoppers are of brick panels in a steel framework, and with brick-lined steel cones. In the compartment for large coke (as well as in the night storage hopper mentioned above) there is a cast-iron spiral chute to prevent breakage of the coke in falling into the hoppers.

Chutes are provided to discharge the coke from the hoppers to carts, to railway wagons, or to a "Belle Isle" weighing and bag-filling machine, which is arranged on a platform at a height convenient for the loading of lorries.

Gasholders.

The extension scheme included the erection by Messrs. R. & J. Dempster of a waterless gasholder of the M.A.N. type, which has a capacity of 2 million cu.ft. The height of the holder to the eaves is 192 ft. and its diameter is 123 ft. It is built upon piled reinforced-concrete foundations. Steel staircases and platforms give access to all parts of the exterior, and a small electric lift operates from the ground to the roof level, giving access also to all platforms en route. All lights and switches in connection with the lift are flame-proof.

The tar seal between the gasholder piston and the shell is maintained by five pumping units, each of which consists of two electrically-driven geared pumps with automatic float controls. The pumps are situated at the ground-level in steel weatherproof housings.

Protected glazing in the roof of the holder provides adequate light in the interior. The piston in all positions may be reached from the roof by means of a collapsible staircase.

The remaining storage plant on the works consists of two ordinary two-lift holders, each of which will contain 375,000 cu.ft. There is also a holder of 1½ million cu.ft. capacity at some distance from the works in the district of Eccleston.

Except in the cases of a few units such as the lift and pumps mentioned above, which are electrically-operated, and of two or three machines on the older plant where existing gas-engine drives have been retained, the power requirements of the works are supplied by steam. Lancashire boilers on the works supplement the steam raised in the waste-heat boilers in the retort house.

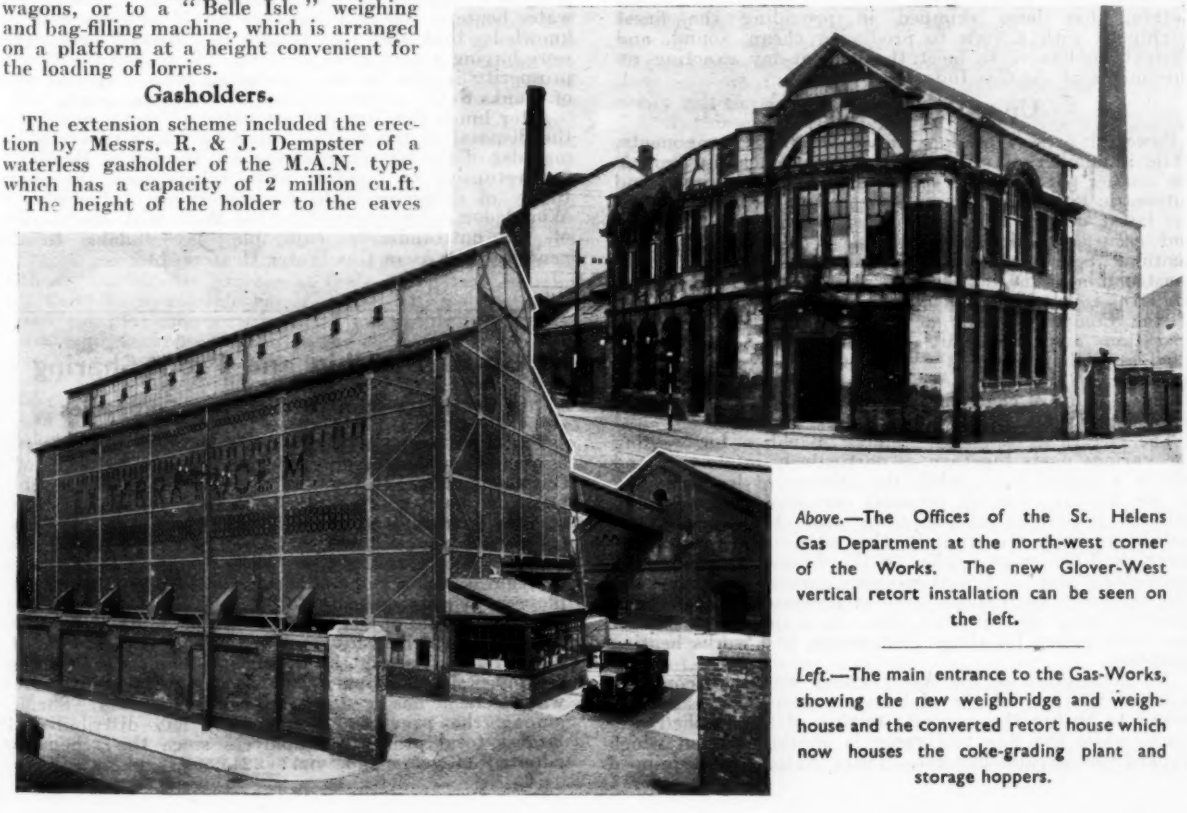
An economy is effected by utilizing the exhaust steam from the engines which drive the gas exhausters for the heating of the workshops.

In the planning of the reconstruction considerable importance was attached to the provision of new and well-equipped workshops. These are light and spacious. Their generous proportions make for the comfort and efficiency of the gas-works staff, and so enhance the efficiency of the whole organization. There is a mechanics' shop equipped with modern machine tools; workshops for repairs to stoves and to meters—the latter with a meter-testing section; a joiners' shop; a general stores and a store for stoves; and a garage. A brickwork shed has been built to house the two works locomotives.

Facilities for the workmen include a mess-room and shower baths for men going off duty. There is also an up-to-date ambulance room in a convenient position adjacent to the workshops.

Roadways of tarmacadam on a stone pitched foundation have been laid throughout the works. At the main entrance from the high road a 30-ton Pooley automatic weighbridge has been installed, which can deal comfortably with the heaviest and largest vehicles passing in and out of the works.

F. E. W.



Above.—The Offices of the St. Helens Gas Department at the north-west corner of the Works. The new Glover-West vertical retort installation can be seen on the left.

Left.—The main entrance to the Gas-Works, showing the new weighbridge and weigh-house and the converted retort house which now houses the coke-grading plant and storage hoppers.

West Country Juniors Come to Town

Visit to Water Heater Works

Members of the Western and Wales and Monmouthshire Junior Gas Associations combined their Summer Meetings into a joint visit to London on June 26, when they were the guests of Ascot Gas Water Heaters, Ltd., at the latter's Neasden Works.

Travelling overnight to London, the Wales and Monmouthshire contingent were immediately on arrival taken in charge by Ascot Gas Water Heaters, Ltd., who, as usual, left no stone unturned to give them a right royal time, even to providing breakfast at the outset at Paddington Station and subsequently conveying them by motor coach to the Neasden Works, where they were joined by the members of the Western Juniors.

Divided up into parties, the visitors were shown every phase of the manufacture of Ascot water heaters, and the care and forethought which is put into each detail of their design and construction gave the visitors sufficient reason for their popularity.

Extensions in Progress.

The Neasden factory was described in some detail in the "JOURNAL" at the time of its opening in May, 1935, so it is unnecessary here to give more than a glimpse of the interesting processes carried out there; though even in the comparatively short period which has elapsed since then not a few extensions have been made to cope with the ever-increasing demand for the firm's appliances.

The works—which are believed to be the largest in the country exclusively devoted to the production of gas water heaters—have an imposing frontage, behind which is a fine suite of offices and showrooms, planned on the most up-to-date lines and provided with the most modern equipment. It is obvious to the most casual observer that no effort has been spared to secure the latest thing in engineering progress, social research, and in essential plant to ensure the highest possible efficiency. The buildings and general layout of the factory have been planned to provide for the comfort of the staff with a view to the best results obtainable by modern equipment and organization.

The very extensive factory buildings—which are now in process of extension—are light and airy, giving excellent working conditions, and although it is clear that they have been planned for mass-production, one feels that the objectionable elements which sometimes characterize the massing and merging of machinery and men in timed operations are absent from these well-regulated works. Nothing has been skimped in providing the finest machinery with a view to producing cheap, sound, and efficient appliances to meet the present-day exacting requirements of the Gas Industry.

Up-to-Date Equipment.

Powerful presses produce the deep-drawn components, while a number of universal stamping machines provide the smaller parts at high speed. The capstan, turret, and automatic lathes used for making rod and castings are of the latest design, and ensure that combination of speed and accuracy which is so essential to economical production. Special plant is provided to ensure the accurate construction of the burners, bodies, and heating elements, while the coils and pipe bends are bent and set by machines of the Company's own design. Brazing and soldering operations are carried out with the aid of Selas gas supplied at high pressure, the same fuel being also utilized for the heating of the stove enamelling ovens and tinning baths, which are controlled in every case by "Perfecta" thermostats.

The electrical resistance welding machine, for welding the various parts together, is particularly interesting and effects a perfect joint, while the subsequent lead-spraying of the heating elements prevents corrosive attack by any sulphur impurities in the town gas. The plating and polishing shops also contain the most up-to-date equipment, and the same applies to the de-greasing and stove enamelling plant. A well-equipped power house provides the necessary current for various processes, the air compressors being also situated here. In a spacious basement are coke boilers for steam, hot water, and works heating purposes.

No description of the Ascot works would be complete without mention of the elaborate precautions which are taken to ensure the accurate testing of the finished product, while the fine tool room is another section which evoked considerable interest. There is also a well-equipped laboratory, where the many problems connected with the construction and development of gas water heating appliances are carefully investigated. One is impressed with the fact that every complaint, however seemingly trivial, is carefully considered and dealt with.

Finally, a reference to the social and welfare side—there is a well-appointed first-aid department, while the messrooms, washing, and bathing facilities leave nothing to be desired. Adjoining the works is the Ascot Sports and Social Club which provides every facility for the recreation of the employees.

Luncheon at Brent Bridge.

At the conclusion of the inspection of the works, the visitors were taken to the Brent Bridge Hotel, where about seventy sat down to luncheon as guests of Ascot Gas Water Heaters, Ltd., on whose behalf Mr. Leopold Friedman (Technical Engineer) offered the Juniors a hearty welcome to Neasden, with the hope that they had enjoyed the tour of the works and seen for themselves that such an apparently simple piece of apparatus was not such a simple job to produce. It called for a large number of specialized manufacturing processes. Mr. Friedman went on to say that his firm were very busy at the present time, and were turning out heaters at the rate of one per minute; but this was not fast enough, and with the help of the Gas Industry they were going to do more. The reason that they were making instantaneous gas water heaters instead of storage was solely because they were trying to keep pace with the needs of Gas Industry. They hoped to have produced 150,000 "Ascot" heaters by the end of the present year—and with the Industry's help they could do even better.

On behalf of the members of both Associations, Mr. S. B. JONES (Clevedon), President of the Western Juniors, expressed the visitors' appreciation not only of the kind invitation to the Ascot works, but also of excellent transport arrangements which had been made for them, and of the firm's generous hospitality. He went on to refer to the great interest it had been to them to view the many processes involved in the manufacture of "Ascot" gas water heaters, and said that they would go away with the knowledge that when they bought an "Ascot" heater they were buying a very good product. He wished the firm all prosperity in the future, concluding with a special word of thanks to the guides who had shown them round.

After lunch the firm put a number of motor coaches at the disposal of the visitors, most of whom spent the remainder of the afternoon at the Air Display at Hendon, a few returning to London, while others took the opportunity of dropping in to see something of the play at Wimbledon. All returned to the West with the memory of an outstandingly enjoyable day—thanks to the generosity of Ascot Gas Water Heaters, Ltd.

Co-Partnership and Profit-Sharing

Statistics from British Gas Companies

The June issue of *Co-Partnership* contains interesting figures of Co-partnership and Profit-Sharing schemes of 58 Gas Companies. In point of time the South Metropolitan Gas Company is, of course, the senior, its scheme having been in operation, at December 31 last, for 47 years, and the figures range down to Barnet with its two-year old scheme. The Gas Light and Coke Company heads the list as regards the amount of shares and deposits held by employees, the figure being £1,627,959 out of its total share and loan capital of £44,357,487. In the South Metropolitan £1,090,214 was held by employees out of a total capital of £11,591,152. Among the provincial Companies the largest employee shareholding is £150,045 at Brighton and Hove, whose scheme has been in existence for 16 years. Sheffield, among the provincial Companies, has distributed the largest total profit to employees since the scheme was adopted 14 years ago, viz.: £245,591.

INSTITUTION OF GAS ENGINEERS

Annual Meeting, June 1-4, 1937

Written Contributions and Replies to the Discussions

In this, our Third Institution Number, we publish the written contributions to the discussions, together with the Authors' replies, on the Papers presented at the Annual Meeting of The Institution of Gas Engineers, held in London from June 1-4. Our First Institution Number on May 26 contained abstracts of the Papers, while in our issue for June 9 was a full report of the verbal discussions.

CHANGING INFLUENCES in Gas Manufacture

Communication No. 155

by
E. G. STEWART
(Assistant Chief Engineer, Gas Light and Coke Company)

Mr. E. V. EVANS (South Metropolitan Gas Company) wrote: Mr. Stewart has urged the necessity for greater co-operation between those engaged in the manufacturing side of the Gas Industry and those engaged in the distribution of gas and the provision of gas-using appliances. If his Paper is read in conjunction with that of Mr. Masterman, then it is evident that the ground is all prepared for such co-operation. We may regard it as a very real advance when the manufacturer of gas appreciates the necessity of drawing close limits within which variations in quality are permissible and goes to such pains as Mr. Stewart has done to define gas quality on its broadest basis. It is a matter for regret that the specification of gas quality is becoming obscured by such a forest of test appliances, factors, and indices, and it will be a valuable piece of work if the research chemists of the Institution are able to give us a simpler yet comprehensive method of expressing properties of a fuel gas.

There can be no doubt that the adherence to a more rigid standard will bring new manufacturing problems in its train, particularly when the maintenance of these standards has to comply with economic requirements. In order that the manufacturer of gas may not be hampered in his efforts it is necessary that he should have the widest possible choice of methods of manufacture and I regard complete gasification in conjunction with the synthesis of methane and similar process as tools which may become very valuable in capable hands. After all, we do to-day regard the manufacture of gas as essentially a chemical process and we know that when the chemical industry requires a product of high and unvarying quality it usually chooses to obtain its product by synthesis from simple compounds. It is not impossible that the future processes of gas manufacture may incline more to the nature of a synthetic chemical process than to that of destructive distillation.

Mr. T. F. E. RHEAD (Birmingham) wrote: When towards the end of the War the enquiry into gas standards was made by The Institution of Gas Engineers and the Fuel Research Board (which led up to the Gas Regulation Act, 1920) it was realized by such men as Professor Bone that sooner or later gas composition would have to be kept within certain limits if combustion characteristics were to be kept constant.

These characteristics, comprising as they do flame velocity, range of explosibility, flame temperature, combustion intensity, radiating power of flame, &c., vary so much for the different combustible constituents of town gas that the problem of keeping them constant was altogether too complicated for the Gas Industry at that time. Such refinements had to give way to the far more important matter of turning out a gas of constant calorific value at as low a price as possible. As evolution went on, specific gravity received attention by many concerns and now it is a welcome sign of the great advances made in the manufacture of town gas, that the Gas Industry can seriously turn its attention to gas composition.

Much research is still required before we can specify the best all-round composition for gas in any particular area. For example, we know so little about that motley crowd of combustibles which we term " unsaturateds " and which vary so much according to method of production, whether by retorting or carburetting. In this respect the debenzolizing of gas leads to a simpler composition, but whether it is desirable from the point of view of combustion characteristics must be determined by research. The gas sales side do not yet know what they want in this direction—what suits furnace requirements does not necessarily suit the domestic consumer.

Still, this evolution is all very encouraging and appeals strongly to the scientific training in most of us. More power to research in this direction.

The Wobbe Index.

Mr. G. C. PEARSON (Birmingham) wrote: In regard to the combustion characteristics of coal gas, I note from the Paper that the Wobbe Index indicates the heat input of an appliance and is expressed as $\frac{C.V.}{\sqrt{Sp.\ Gr.}}$. At times when distribution is already stressed and the specific gravity is probably increased owing to the introduction of water gas to augment production, gas input to appliances may be restricted. Would the Author favour an increase of calorific value of gas as a means of overcoming this difficulty? By increasing the throughput of coal in the retort house a higher calorific value could be obtained accompanied by temporary increase of gas manufacture.

With reference to the preparation of coke for the market, it may be interesting to observe that at one of our Birmingham works the screening plant is divided into two parts, one for dealing with coke suitable for household sales and the other coke for industrial purposes. The coals most suited for production of household coke are allocated to certain ranges of retorts and the coke discharged is kept separate and delivered to the household half of the plant, the remainder becoming industrial sales. By this means it has been possible to improve considerably the coke used for household and industrial purposes and definitely to increase the popularity and sales.

Mr. Stewart sounds a warning note on the danger of allowing the cost of coke handling to exceed the extra

profits obtained from sales. There is no doubt that while this may occur on smaller works, in the larger Undertakings by careful design it is possible for all such handling to be done in a mechanical way and at a very cheap cost. An arrangement such as indicated can be accomplished with small overheads.

Mr. Stewart refers to the need for the provision of reserve manufacturing plant in excess of the maximum day's output. The question of provision of stand-by plant is an interesting problem and the locality of the undertaking has a very profound influence on these considerations. Where the district has a substantial industrial load it is more necessary to consider the output for the maximum week than for the maximum day. The rate of output of gas at the week-end would be some 30 per cent. lower than during the week, and it is possible to have insufficient plant to meet the maximum day and yet by the use of holder storage adequately to meet the maximum week of any year.

It must be remembered, however, that while the maximum weeks of each year when plotted on a curve appear to have more or less a constant increase, there will occur at intervals of a number of years such abnormal weather conditions that the maximum week is far in excess of the normal increase in such outputs. It must be expected that, should similar severe conditions recur, the output will be in relation to this maximum of some years ago, but increased in accordance with the progression of the undertaking since that time. This liability can be forecasted by mathematical means. To provide adequately by normal manufacturing methods to meet such a load involves a big capital expenditure and places a heavy charge on the price of gas per therm, and while seriously viewing the necessity for continuity of supply, I think the gas engineer is justified in trusting to meet such abnormal outputs by unusual methods of procedure that would not be likely to be required in operation for more than a few days.

Excellent Use of Exceptional Opportunities.

Dr. R. Lessing (London) wrote: In the preparation of this Paper Mr. Stewart has made excellent use of the exceptional opportunities available to him in his position at the fountain head of information on gas matters and of his own encyclopædic knowledge of all phases of the Industry. His survey of the present status and the tendencies of future development in the Gas Industry will, in my humble opinion, rank as a basis of the Industry's stock-taking for a long time to come. My justification for taking part in this discussion is the pleasure experienced of a dream come true (at least in part).

In 1917 when the desire of not "letting down" the consumer could, owing to war conditions, only be met by supplying him with cubic feet of doubtful thermal value, I had the honour of being commissioned by the South Suburban Gas Company to investigate the quality of gas which should be supplied after the state of emergency had ended. I then approached the subject very much on the lines adopted by Mr. Stewart but without the advantage of possessing the results of experimental work or manufacturing experience which are now available. The detailed examination of coal gas of varying composition, in regard to both the minor constituents and inerts, led me to the conclusion that the consumers' requirements must be studied on the basis of the heat content of the gas-air mixture, while the appliance maker in the design of his apparatus must take the individual components of the mixture—*i.e.*, the gas and air—separately into consideration. The development which has taken place since then is well brought out in the section on combustion characteristics of Mr. Stewart's Paper.

I am particularly gratified by the Author's plea for simplifying gas supply by reducing the multiplicity of declared calorific values to a minimum. I believe that my final recommendation in the report referred to was the first suggestion that gas should be sold on a thermal basis. The strong opinion I expressed, even then, that the price should be fixed on a definite calorific value and that this calorific value should only be increased or decreased within certain limits, will explain my unqualified approval of Mr. Stewart's plea.

The mills of industrial progress grind slowly and not exceeding small at that. For, twenty years have passed and although a steady advance has been made by the Gas Industry during this period, a great deal of the hard work which one could foresee at that time has yet to be done. The unification of gas quality, or a condition approaching it, must be the obvious aim in national planning of the Gas Industry just as it is in the electrical industry.

In this connection the Institution is to be congratulated that the question of the elimination of sulphur compounds has been frankly discussed on its platform and the Author's reference to the treatment of London gas in this respect is most informative. The strides made by the power stations at Battersea and Fulham in the complete removal of sulphur from their products of combustion should be an inducement to the Gas Industry to extend the slogan "sulphur must go" to include the retort house itself and thus complete its noble work in the fight against atmospheric pollution. It may be shown when the next stock-taking is made that this desideratum has been achieved.

Mr. H. L. Bateman (Dewsbury) wrote: I would like to congratulate Mr. Stewart on his excellent Paper. At Dewsbury we have been carrying out experiments with the extraction of sulphur compounds and find that with a circulation of 400 gallons per hour of special oil our sulphur compounds average 10 grains per 100 cu.ft. We have a Newton Chambers double distillation plant and believe, like Mr. McLusky, of Halifax, in changing all the purifiers in the early part of the year. We control the flame volume of town gas with the use of Gray's bunsen apparatus, and these results refer to straight coal gas made from Yorkshire slacks.

Mr. H. C. Widlake (Plymouth) wrote: I should like to refer to the potential value of a schedule of plant covering the various types of apparatus and machinery used on British gas undertakings. Such a schedule need not necessarily be circulated, but would be kept at the offices of The Institution of Gas Engineers, revised from time to time and would, on application, be available for the information of engineers who wished to make contact with an undertaking using some particular type of plant.

When an Engineer is contemplating additions or replacements, he usually asks the tendering firm "Where can I see this particular type of plant in operation?" It frequently happens that the information imparted to him is not altogether satisfactory and he subsequently discovers that, had he been properly informed, he might have visited a works where the plant he had in mind was running under conditions comparable to his own.

A schedule of the type here suggested should be of considerable value in that an engineer could apply to the Secretary of the Institution, naming the type of plant in which he was interested, and ask for a list of undertakings on which such plant was actually working.

The Author's Reply.

Mr. E. G. Stewart, in reply, wrote: In the first place I should like to express my appreciation of the manner in which this Paper has been received. Wide and varied interests were represented by those who contributed to the discussion, so that the opinions expressed must possess added importance. It is the more noteworthy then that, in spite of a full realization that there would result a limitation of flexibility in gas manufacturing methods, sympathetic appreciation was given to the improvement and limitation of variation of gas quality.

The proposal for the standardization of a limited number of calorific values in lieu of the present multiplicity was well supported. Mr. McLusky considered the choice of five values suggested to be generous. On the other hand, Dr. Hartley hoped that it might be possible to reduce the number to not more than three. In his excellent analytical opening to the discussion, Mr. Finlayson, while agreeing that the limitation was logical and progressive, properly indicated that declared value must bear a relationship to the type of coal most easily obtained in any given area. The only dissentient note, and that a mild one, came from Mr. Restall, who feared that developments in the coal situation might so influence the types of plant to be built in the future as to affect the most suitable calorific value. These two criticisms are not, to my mind, very serious. The five values suggested give a range suitable for gas from any known methods of manufacture, while the smaller selection of three would obviously not result in hardship inasmuch as actual analysis of the gas sold in the British Isles showed that values of 450, 475, and 500 would cover 90 per cent. of the total.

The subject of sulphur compounds also attracted much interest. It was gratifying to find that proposals for their reduction met with such strong approval, while I was extremely interested to learn that plants for the purpose are in operation at such works as Mirfield and Dewsbury.

Mr. Cooper pointed out the important fact that complete stripping for benzole is not essential in order to obtain an appreciable reduction of sulphur compounds. Mr. Finlayson rightly questioned whether an important fundamental refinement such as the removal of organic sulphur ought to be dependent upon the removal of benzole from gas. With this view I am in entire agreement, but I think it is clear from the Paper that the association of the partial removal of sulphur and the extraction of benzole was mentioned particularly as being one wherein sulphur reduction could be effected at no cost and at once when

economic circumstances favoured the extraction of benzole. Mr. Finlayson and others will be pleased to hear that there is every reason to expect in the near future a simplified process of the catalytic type to be available for sulphur reduction.

Dr. Lessing suggested that the slogan "Sulphur must go" will before long have to include the retort house itself and other sources of discharge of flue gases into the atmosphere. In view of the results which have been secured from the installation of flue gas washing plants at several recently constructed London power stations, his remarks should command the serious attention of all gas engineers.

Improved Purification.

Mr. McLusky showed how improved purification results can be obtained by the proper use of ample washing and scrubbing plant. Doubtless, his experiences will give much food for thought, especially when the low sulphur content of gas he makes and the almost entire absence of naphthalene and moisture which he claims are secured without the use of any special eliminating plants. He also reminded us that calorific value alone is an indeterminate measure of the value of gas. This is, of course, very true, and standardization of calorific value is but one stage towards the unification and definition of gas quality to which Dr. Lessing and Mr. Evans gave valuable support.

Mr. Rhead suggested that the gas sales side does not yet know what it wants in the direction of combustion characteristics. There is some truth in this assertion. But every day its ideas are becoming more nearly crystallized as a result of research. The corresponding investigation of manufacturing processes so that specifications of gas quality can be met, or, if this be impracticable, proposals made for the modification of designs of gas using apparatus to suit what can be produced is not, however, receiving such close attention. Meanwhile, the real difficulty lies in the lack of ability to specify such requirements as are definitely known, and Mr. Evans' regret that the specification of gas quality seems likely to become obscured in a forest of test appliances, factors, and indices ought to be given serious attention. Accurate means of measurement must precede precise specification. It was to bring out this point that I gave consideration to the development of the Aeration Test Burner. I am indebted to Mr. Minchin for his description of the limitations and value of this test. His remarks upon the effect of specific gravity variation were also interesting when compared with those of Dr. Hartley. Although the latter's views are in accord with German proposals, there is evidently not entire agreement on the utilization side as to the range that can be permitted.

While methods of specifying the requisite qualities of gas remain somewhat hazy, the manufacturing side must take the opportunity of pressing on with research work, so as to enable the best composition of gas to be ascertained and methods of production brought under close control.

The remarks of Mr. Rhead and Mr. Finlayson concerning the hydrocarbon enrichers in gas are most apt, and will repay careful attention. Mr. Finlayson pointed out that the whole of the difference between declared calorific value and the calorific value of hydrogen and carbon monoxide has to be supplied by hydrocarbon enrichers, and rightly draws attention to the importance of controlled cracking. Mr. Rhead made a strong point of the desirability of research into the nature and methods of production of these hydrocarbons. Mr. Evans went further with the suggestion of methane synthesis, and, as I understand, visualizes the regulated addition of hydrocarbon enrichers. In this connection processes for the partial removal of carbon monoxide may ultimately have a value as yet unrecognized.

Limiting Quality Variations.

In view of the state of present knowledge it was distinctly pleasing to learn of the praiseworthy attempts which are being made by a number of gas engineers to limit variation in gas quality. Such pioneer work is valuable. The information given by Mr. Townsend of his working to this end will be closely examined, and should stimulate others to follow his example. In my view the limits of variation which he has succeeded in obtaining are highly creditable, although, as will be noticed, they are still somewhat wider than those which have been proposed in Germany. His method of control involving the reduction of steaming and of benzole extraction on the one hand, and an increase of water gas and hydrocarbon enrichers on the other, seems to follow the methods suggested by Mr. Finlayson and adopted by Mr. Pearson and Mr. Restall, but, as several speakers pointed out, it is not likely to be as economical as the more common methods of procedure. Mr. Pearson put one side of the case very fairly when he pointed out that to provide for the most severe peak loads by normal manufacturing methods—that is, without variation of gas composition—might involve such a large capital expenditure and place so heavy a charge on the price of gas per therm that the engineer would be justified in meeting abnormal outputs by unusual methods of procedure, and presumably without too much thought of variation in gas composition. But is it not equally true that good service is especially desirable during periods of abnormal demand?

Dr. Hartley asks for certain additions to Table 3 and I give them here below:

—	Straight Coal Gas from Horizontal Retorts, not Debenzolized.	As Col. 2 Debenzolized	Gas from Steamed Vertical Retorts, not Debenzolized.	Mixture of Debenzolized Straight Coal Gas and B.W.G.	Mixture of Debenzolized Straight Coal Gas ($\frac{2}{3}$) and C.W.G. ($\frac{1}{3}$).	Carburetted Water Gas.	Blue Water Gas.
1	2	3	4	5	6	7	8
Air required	4·86	4·70	4·30	4·45	4·39	4·23	2·11
H_2O	1·194	1·180	1·092	1·114	1·009	0·796	0·515
CO_2	0·476	0·455	0·430	0·452	0·537	0·704	0·416

He also asks for enlightenment as to the expression "Intrinsic flame velocity curve of gas" in Figure 1. Perhaps there was some looseness of expression here, and the words "appropriate flame velocity" would be preferable. What was meant was the flame velocity of the gas mixture at the appropriate air-gas ratio as determined by the methods indicated in the Literature Reference, No. 25. It will thus be seen that the conditions under which the gas is burnt are taken into account in recording the flame speed. I thank Mr. Minchin for his simple exposition of this diagram.

Dr. Hartley made a plea, as also did Mr. Widlake, for further statistical information as to plant installed, the nature of gas supplied, and similar detailed technical information throughout the Gas Industry. The Industry already owes much to the Technical Press for the efforts they have made to meet such demands in their excellent and growing annual productions. I would mention, however, that an annual manual giving comparable information for the electrical industry has grown to 2,000 pages after 36 years' regular revision and costs nearly £2. Would such a compilation find a sufficient market to be profitable?

Mr. McLusky suggested that moisture in gas is a condition set up in the dry purifying system, and seeks my views. While, of course, moisture is produced by the reactions in the vessels, I suggest that as gas throughout the whole purification and storage process is normally in contact with water, its moisture content at any time is surely determined entirely by its temperature and pressure conditions.

Mr. Pearson's remarks upon the provision of reserve manufacturing plant are arresting. In particular I was interested in his suggestion that the outputs of periodic maximum weeks can be assumed to increase in accordance with the progression of the Undertaking, and can be mathematically forecast. A major difficulty that I have found in connection with such forecasting arises from the long period which sometimes elapses between the occurrence of very severe peaks. During this interval there is often a change in load factor which is difficult to assess. It is now, for example, eight years since London has experienced a winter cold spell with the temperature below freezing for an appreciable period, and the conditions of gas demand have obviously changed in that time to an extent sufficient to upset any straight line law.

Mr. Evans and Mr. Restall have referred to complete gasification as a likely process of the future, and I am of like mind. The progress of development of this type of plant, especially the oxygen and high-pressure type, must be closely followed and encouraged, but so far as this

Paper is concerned there is much to do right now in the way of improving our present gas product to suit the standard of modern requirements. These requirements can be largely met by the better control of existing plant and processes in which many millions of pounds of capital are sunk. For the present, then, coke and its marketing must continue to occupy the attention of the gas engineer. Mr. Pearson's comments on coke preparation are of value, but I still hold the view that there is a tendency to prepare special cokes in many places at a cost exceeding their market value. I was glad to have Mr. Finlayson's support upon the necessity of co-operation in coke sales, and of his emphasis of the essential necessity of a stable coke market if gas quality is to be more closely controlled.

Not least of the changing influences in gas manufacture is the ever-increasing application of scientific knowledge and endeavour to its problems. This inevitably entails specialization, and Dr. Hartley's plea for frequent and frank discussion between technicians engaged in different aspects of the Gas Industry is timely. But for collaboration such as he desires I could not have produced this Paper, nor would a discussion such as has occurred have been possible, and I am accordingly grateful to all who have given me their interest and assistance.

Distribution of Gas in SUBURBAN AND RURAL AREAS

Communication No. 156

by
H. J. ESCREET
(Distributing Engineer, Gas Light and Coke Company)

The Author's Reply.

Mr. H. J. ESCREET, in reply, wrote: I should first like to thank all those who took part in the discussion for their kind remarks with regard to the Paper generally. In reply to Mr. McLeod, we have had a number of slum clearance schemes in the Gas Light and Coke Company's area, but no reference was made to these in the Paper, as it seemed better to deal with new development rather than replacement schemes.

I note Mr. McLeod's remarks as to the use of turned and bored joints, but I think he misunderstood the Paper when he asked what difficulty I experienced with the fully turned and bored joint to make me consider it unsuitable for medium pressures. I was referring to the half turned and bored joint, as we have never used the fully turned and bored joint except for a few mains laid many years ago. I am glad to hear that Mr. McLeod has found fully turned and bored joints so satisfactory. I have always felt that there were two serious disadvantages in this joint (1) that it was so rigid, and (2) that should leakage develop there was no way of stopping the leakage other than by the use of a split socket or muff.

With regard to the query as to the effect of aerial bombardment on the high pressure system on the Grays area, it is an interesting fact that one of the mains on that system was broken by an anti-aircraft shell during the last war. This was referred to in a Paper* by Mr. A. W. Sumner which was read before the Institution in 1926 and where it was stated that "The compressors took up the load at once and maintained pressure for two hours without causing any inconvenience to consumers in other parts of the district. At the end of this period it was possible to close an emergency valve and so restore normal conditions." Although I am afraid that we must expect much more severe conditions in the next war and there is of course little comparison between an anti-aircraft shell and a heavy bomb, there is at least the advantage with the high pressure system that valves are provided at frequent intervals and it is, therefore, possible to shut down a main with comparatively little delay. As, in addition, valves are provided on all branches it is usually possible to isolate a small section without affecting the remainder of the district.

In reply to Mr. J. A. Gould, as stated when I presented the Paper, the annual charge per therm for mains is only used in regard to local mains, and costs of trunk mains are considered separately. No allowance for the cost of services is made, but the fact that the whole cost is not recovered from the consumer is taken into account when fixing the limiting value of "pence per therm."

I note that the South Suburban Gas Company uses the formula 20 C=N. This formula gives the same result as that used by this Company if the annual charge is taken as 1d. per therm. I am glad to note that the figures of annual consumption which were quoted are confirmed by experience on the South Suburban Company's area. It is only in a very few cases that we make any charge for the main. In cases where it appears that there would be a loss on the outlay, generally we either agree to lay the main free or refuse to lay it at all. I have found in the past that if contributions from individual householders are asked for a number of them will agree and afterwards when we are committed to laying the main, some refuse to pay and one must then either lay the main free of charge or cancel the arrangements made with the people who are still willing to bear their share of the cost. In the case of estate development where the land owner is laying out the roads and wishes to sell with a supply of gas available we generally make it a condition of laying the main that the land owner should sell the land subject to houses being properly carcassed for a number of points, which varies, of course, according to the size of the house. This condition is also applied in the case of the ordinary housing estate. We have in some cases made an agreement under which the developer pays a proportion of the actual cost, or interest on the capital, less a rebate, based on the consumption of houses already erected, but we have not generally found this to be a very satisfactory arrangement.

Mains Costs.

With regard to details of mains costs, those for the larger mains as shown in Table 6 are all based upon work carried out by contract and therefore include all overheads, except for the Company's office expenses. The laying of smaller mains is partly carried out by the Company's own men and partly by contract and the rates given are based on average results for both methods.

I have already dealt with the question of turned and bored joints when replying to Mr. McLeod. I note Mr. Gould's comments upon a composite joint, and while I am inclined to agree that one perfect joint does not need a second one in order to keep it tight, I feel that as few joints are perfect it is perhaps better to use several jointing mediums, rather than to rely entirely on one type of material. In this connection I might add that it is difficult to see why the fully turned and bored joint should be more efficient than the half turned and bored joint, since if true metal to metal contact is obtained it would appear that a narrow band would be just as effective as a wider one.

With regard to the Dresser leak clamp, some of these were tried in the Company some twenty or more years ago, but later we found that the joints were leaking again and had to take the clamps off as the rubber had gone hard. We did not, therefore, extend their use. With the improvements in rubber which have been made during recent years we are now giving further consideration to this matter and have fitted several sections of main with this type of clamp in order to see how the new varieties of rubber stand up to conditions.

I thank Mr. Briggs for his complimentary remarks and for his very interesting contribution to the discussion. I agree that the actual expenditure per million cu.ft. corresponding to the annual charge of 2½d. per therm is relatively high, but this is, of course, rather the limiting figure and by no means the average expenditure for supplying new property. In any case it is very difficult to refuse to supply even though the supply of the outskirts involves a disproportionate capital expenditure per million as compared with the area as a whole.

With regard to the use of steel tubing for service pipes, it has been the Company's practice for the last few years to use only steel pipe both for services and carcassing. After a rather lengthy research on the relative resistance to corrosion of wrought iron and steel carried out by Watson House some years ago, the results of which were published in a Report* by Densham and Smith in 1935, it was decided that there was little difference between the resistance of these two materials when exposed to corrosive soil or to stray electric currents and that as it was

* "Distribution of Gas at High Pressure." Trans. Inst. Gas Eng., 1925-26, 653.

* "Report on Protective Coatings for Underground Pipes." Publication Inst. Gas Eng., 1935, 115.

necessary to protect both materials there was no advantage in using the more expensive wrought iron rather than steel.

As regards the use of wrapped pipes and pitch in troughing I feel that a really well troughed pipe is much better protected than a wrapped pipe with hand wrapping on the joints. We are, therefore, using troughing for the more corrosive soils or under expensive paving, and using wrapping in less corrosive soils or in districts where paving costs, and therefore future maintenance costs, are lower. I would also point out that troughing is less likely to be damaged by the work of other undertakings than the ordinary type of wrapping.

In reply to Mr. Richbell, I think I have already dealt with the question of contributions from builders, &c., when replying to Mr. Gould. With reference to the annual charge for mains which must be met by the profit from the gas consumed, I meant to imply that unless this annual charge were covered by the part of the selling price of gas which is available to cover " distribution " there would be an actual loss to the Undertaking due to the extension of the main.

As stated above, the costs of mains in Table 6 are based on charges made by our contractors and therefore include overheads. I am interested in the figures for the cost of laying quoted by Mr. Richbell and envy him for being able to lay them so cheaply. After allowing for the cost of pipes it would appear that the actual cost of labour per yard is only 5s. in the case of the 12 in., and 15s. for 24 in. mains. These costs are, I think, exceptionally low.

On the Grays area the majority of the consumers are supplied direct from high pressure mains through service governors. With regard to the Hortonsphere, gas is introduced into this at a maximum pressure of 50 lb. per sq.in., but at present it is only used to prevent the outlet pressure falling below 10 lb., and therefore when the pressure falls to this figure the outlet valve of the Hortonsphere is opened just sufficiently to maintain 10 lb. per sq.in.

I have not had much experience of electrical welding with steel mains and am glad to hear that Mr. Richbell finds this method so satisfactory.

I am obliged to Mr. B. R. Parkinson for his comments on the Paper, and wish I could feel as contented as he is with regard to the life of steel mains. While we have a number of steel mains which have been in use for over 20 years and are still in perfectly good condition, we have, on the other hand, had several cases where mains which have been laid for only two or three years have already been perforated by corrosion, although they have been protected by modern types of wrapping, which one would expect to be superior to those which were used in the early days of laying such mains.

I note Mr. Gill's remarks as to low consumptions in some country areas. It is fortunate that these low figures are to some extent compensated for by the lower cost of main-laying in such districts.

With regard to the use of expansion nipples for spun pipes, I have had no experience of these and have not found such nipples to be necessary. In order to take full advantage of the greater strength of spun iron pipes, it has been our practice with the smaller sizes—*i.e.*, 6 in. diameter and under—to use the thicker classes so that when connecting services we obtain approximately the same number of threads in the pipe as we should with British Standard pipes. For the larger size pipes we use the thinner section, as there is a greater margin of safety with the larger diameter, and the thin section is quite sufficient for service connections. I should, however, be very glad to hear from Mr. Gill the result of his experiments in due course.

As one responsible for the distribution of gas, I was glad to have from Colonel Temple his testimonial as to the greater reliability of gas supply compared with electricity.

I was very interested in Mr. Robinson's description of the high pressure system on the Harrogate Gas Company's area and note that he has used high pressure cylindrical holders with satisfactory results. I note that he found the peak load rate of 15 cu.ft. per hr. per consumer to be sufficient when calculating demands in the rural parts of the area, and should like to confirm that on the area as a whole we find the figure of between 10 and 15 cu.ft. per hr. per consumer is approximately correct.

Low-Pressure Mains and District Holders.

I note that on the Bishop Stortford and Epping areas the system of supply is based on low pressure mains and district holders. I have not had much experience of such a system, but from what I have seen I entirely agree that it is rather difficult to keep the holders full at times of heavy demand and that the floating holders make it difficult to keep the pressure on the district to a reasonably straight line. I think that under most conditions it is probably better to spend money on providing feeder mains rather than the installation of small holders dotted about the district.

With regard to Mr. Robinson's remark as to the pressure used on the Grays system, I agree that this is rather high, but as the pumps have been installed for this pressure there is no advantage under present conditions in laying a considerable number of larger mains in order to enable pressure to be reduced. As I stated in section 6 of the Paper, it is proposed to deal with the increase in the peak load by the installation of high pressure holders at convenient points on the district. From my experience of the first of these, which was installed last year at Canvey Island, I think that this system will enable us to deal with considerable increase in demand without any further increase in initial pressures or the enlargement of the trunk mains. The maximum demand is only for quite a short time on a Sunday, and on some parts of the area even this load is only heavy during the summer months. A relatively small reserve of high pressure gas either in a Hortonsphere or cylindrical holder would, therefore, enable this peak load to be met.

I note that Mr. Robinson considers underground governor chambers to be objectionable. I agree that steel kiosks may be more convenient in districts where suitable sites are available, but in urban areas there would generally be considerable difficulty in obtaining room for the kiosk near the point at which the governor was required. In the Gas Light and Coke Company the underground chambers are provided with ventilating columns so that there is little risk of danger from escapes of gas.

TECHNICAL ASPECTS OF

Communication No. 157

The Holding Company Movement

by
G. M. GILL
(Director, Severn Valley Gas Corporation, Ltd., and Gas Consolidation, Ltd.)

The Author's Reply.

Mr. G. M. GILL, in reply, wrote: Colonel Carr in his remarks stated that he disagreed on many points and proceeded forthwith to argue that the Holding Company must not destroy the initiative of the man on the spot and must support him in every way possible. I would like to make it clear that no one can agree with such a policy more than I do. In fact, I wished the Paper to give the impression that the keynote of the Holding Company movement should be to give service and support to its subsidiaries and their local management.

Colonel Carr criticized the type of organization set out in the Paper upon the score that there were considerably more technical than sales staff. In this matter I would explain that, of the technical staff of twelve, whose duties were set out in the Paper, three work part-time only for the Holding Companies, while of the remaining nine members, five are usually doing constructional work which before the advent of the Holding Companies would have been done by contractors or not done at all. This leaves only four members of the technical staff who are not associated with sales, and, of these three are chemists. Having regard to the fact that the way for increased sales of gas and of gas appliances must be paved first with a good and reliable product and backed up with a good supply of gas, it is suggested that the type of staff as set out in the Paper is well balanced, especially taking into account that many of the subsidiary Companies have not long been under the control of the Holding Companies. I agree with Colonel

Carr that eventually there is likely to be a larger proportion of sales staff, but consider that the foundation upon which to build must first be laid.

I agree, however, with Colonel Carr's general outline of the policy and ideals of the Holding Company.

As regards industrial salesmen, we would be prepared to employ more men of this type as soon as there appeared to be need for their services, but in residential towns such as are for the most part supplied by our subsidiary Companies, the opportunities of work for these men are few and far between, although the reverse is the case in industrial towns.

In regard to the basis of the charges made for the services rendered by the Holding Companies, this is a matter upon which there can be considerable differences of opinion, but the method described in the Paper is one which has been evolved as a result of experience. There is at least some advantage in adopting a basis which is easily understood and can be arrived at as the result of simple calculations.

I welcome the remarks of Mr. P. C. Holmes Hunt, who is home from Australia, and who explained the method which he and his colleagues had evolved in controlling the Colonial Gas Association with its 26 subsidiary Gas-Works situated long distances apart. As regards finance, I might point out that in this country there must perforce be a difference as compared with conditions in Australia, as each Company is a distinct entity with its separate capital restrictions controlled by Parliament. Something of value can always be learnt from a long experience in work of a similar kind in Australia, and his remarks will be studied with interest.

I agree with Mr. Briggs that the financial aspects cannot be divorced from technical operation and administration, but I deliberately omitted so far as possible references to purely financial matters as being outside the scope of the Paper. I would, however, explain that my reason for stating that the Holding Companies do not buy a gas company lock, stock, and barrel was to remove an impression with which we frequently have to contend during negotiations. In actual fact, the purchase of the control of a subsidiary Company can be completed without anyone in the town, except the shareholders, knowing anything about the matter, and the same applies to the carrying on of the business under the new regime, as everything remains the same except a change in the directorate and in the ownership of the majority of the shares.

Sales Campaigns.

Mr. Briggs appears to anticipate difficulties arising in the intervals of visits from the salesmen to the various towns, but I would point out that the visits of the salesmen are either to institute a special campaign or to start modern methods. In either case, the local staff are expected to carry on the good work after the salesman has gone, and in the large majority of cases have done so with satisfactory results. In fact, I can think of no instance in which the fillip given by the travelling salesman has not resulted in good business and for a prolonged period after he has left the district. It can indeed be stated that these campaigns have been highly successful.

Mr. Briggs also deals with the income obtained by the Holding Companies from their subsidiaries. It should be explained that the Directors' fees are in return for compensation payment, and as the Holding Companies have to pay their own nominee Directors, there is not much margin of income in that direction.

Mr. Briggs thinks that the small company selling, say, 30 million cu.ft. per annum, may receive sufficient advantage to justify its contribution to the Holding Company. He considers, however, that the contribution is excessive in the case of a company making 500 to 600 million cu.ft. per annum. From the experience so far gained, it is maintained that both sizes of companies obtain full value from their contributions, although obviously the benefits which are derived from advice are very difficult to put in terms of money. A gradual betterment in the results and in the volume of business done should certainly result from the association of a subsidiary with a live Holding Company. Mr. Briggs no doubt can think of many companies—and I can certainly do so—where the efforts of the management are not supported by the directorate, which is often composed of men who know little or nothing about the Gas Industry and its working. This is not the case with the Holding Companies. As instances of Holding Company control, it can be claimed that a subsidiary Company can obtain overdrafts or deposit its surplus cash upon terms which are considerably better than would be obtainable by an individual company. The advantages which many of the companies have obtained in the direction of savings in income tax and rating have been very material as a result of the work of the expert employed by the Holding Companies. It can be said that this could have been done by the individual companies employing someone with similar expert knowledge, but the fact remains that they did not do so. The same applies in many directions. They could have put matters right, but they did not do so.

Had Mr. Briggs the opportunity, as I have had, of making over 100 investigation reports on Gas Undertakings during the past 5 years, he would realize that in a great number of such Undertakings there are important matters which cry out aloud for urgent attention from the type of staff employed by the Holding Companies. Surely it is right that such important matters should receive attention, but the cost must be met in the form of contributions from the subsidiaries. It is difficult to state, certainly in the early days, the precise benefits which are derived by the subsidiaries. Only time will prove whether the work being done by the Holding Companies has been fully justified. I would, however, express the opinion that the Holding Companies are doing precisely the work which the experienced and progressive gas engineer would and does do when he takes over the control of a new Undertaking.

Justification for Commissions.

As regards the justification for the percentage commissions on the purchase of materials, does not Mr. Briggs think that if he were to purchase materials for 30 companies he would obtain savings which would fully justify the commission charged by the Holding Companies? It is suggested that he could readily justify these commissions and to an extent which previously he would not have thought possible. Is it not reasonable to suppose that a supplier is willing to reduce his prices when he contracts to supply 30 instead of one customer, taking into account that travellers' visits in the numerous towns are no longer necessary? Large contracts will always attract low prices and as a result the Holding Companies can justify up to the hilt the commission on purchases. Obviously, I cannot give chapter and verse for this statement as it would be unfair to and resented by the suppliers.

It might here be suggested that the cheaper prices obtained by group purchasing are the logical result of the suppliers' savings in selling costs, and are not therefore necessarily at the expense of the supplier, especially as due to the greater activity brought about by the Holding Companies, the demand for goods by the subsidiary Companies shows a very material increase. It should, however, be explained that the 2½ per cent. commission is only payable where special terms have been arranged with manufacturers. In cases where subsidiaries purchase outside the contract system—and a considerable amount of latitude is allowed in this direction—no commission is charged.

In the matter of coal the position has changed during quite recent months. Previously, excellent results were being obtained in regard to coal purchases and substantial savings made. Further, material economies were confidently anticipated in many quarters, but the normal methods of buying coal have been thrown into a state of chaos, temporarily it is hoped, and at the moment it cannot be determined whether a large buyer is, in fact, in any better position than a small buyer. Mr. Briggs would, however, agree that the selection of the best coal to buy for the various Works with different classes of plant and in different areas calls for considerable experience and skill, and as a result a gain of considerably more than 1¼ per cent. should be obtainable in many cases. I have the particulars of four Companies for which the contracts have just been renewed until July 1, 1938, for first-class gas coal. The aggregate result of the four Companies shows an increase of 7½d. per ton compared with the coal—also of first-class quality—bought three years ago by the old Directors for the 12 months ended July 1, 1935. In these cases there has been time to make a different selection and purchase coals which were more suitable for the particular Works in question.

As Mr. Briggs points out, the responsibility of the local engineer is not decreased as a result of association with a Holding Company which is more likely to expect greater activity in the management of a company.

As regards the close working together of companies situated in adjacent areas, Mr. Briggs can be referred to the remarks made during the discussion by Mr. C. R. Ingham, of Cannock, who dealt with this matter in some detail.

Mr. Clark Jackson's remarks show that he fully realizes the possibilities of the Holding Companies if they tackle the work in the way which they should.

Mr. C. R. Ingham, who is fully familiar with the working of the Holding Companies in question, gave some instances of what can be done by close co-operative effort on the part of neighbouring Companies which each form part of a Group. Obviously, this sort of co-operation is greatly encouraged and supported by the Holding Companies and frequently matters are referred to the local

Committees for discussion with a view to their guiding the Holding Companies in their policy.

Mr. D. B. Parkinson suggested that there might be a tendency to destroy the initiative of local Managers if too many visits were paid by members of the central staff. In my opinion, there have been no signs that this has happened in practice. On the contrary, there are so many applications for visits from the central staff that it is impossible to accede to all the requests which are made. I think that this shows that their help is appreciated.

I would point out that like the British Gas Light Company the staff of the larger adjoining Companies has in many cases been used to help their smaller neighbours in difficulties.

Research Work.

Mr. C. A. Masterman said that having regard to the "immense variety of technical and scientific problems which are presented in connection with the use of gas, it is a matter of some surprise to find no reference to the methods whereby Holding Companies' organization can meet these problems." While fully recognizing the importance of the problems to which Mr. Masterman refers, I hold the opinion that it does not lie within the province of the Holding Companies to deal with these problems. It is the Holding Companies' policy to contribute to the various national bodies and to the purely scientific side of research, but I suggest that a Holding Company would not be justified in attempting research work of this nature, and apart from that, it would be covering the ground which other people have covered before.

I would also point out that the Holding Companies in question are no larger in aggregate than the large Provincial Undertakings. As their size grows something of the kind as suggested by Mr. Masterman may be possible, but I would submit that a better plan is for one national organization to carry out all the necessary research work in connection with the design, construction, and working of gas-using appliances with the object of setting a seal on those that are satisfactory in the way which has been done for many years by the American Gas Association. I am aware that Mr. Masterman does not agree with this view, but I can see no real alternative to something of this sort. Under the present circumstances, it is impossible to be sure that unsuitable and sometimes unsafe appliances will not be fitted in consumers' houses. In my ordinary practice, I have come across plenty of instances which make me think it very advisable for a manufacturer of any gas-using appliance to be required to obtain a certificate to the effect that the appliance is safe from an organization with the same knowledge, experience, and facilities as Watson House.

I would, however, point out that in my Paper I stated that the Comptroller of Purchases is assisted by a Committee of Managers who discuss in detail the class of appliances and materials for which contracts should be made. In this way shoddy materials and defective appliances are largely avoided, but not to the extent which would be possible were the selection of appliances guided by an organization such as that which Mr. Masterman controls at Watson House.

As regards the remarks of Mr. H. C. Smith, he is certainly right in concluding that a Holding Company in many cases begins to spend money when it obtains control of a Company. This is due to the fact that in many cases natural development has been stifled for want of enterprise. In many cases very little has been done in the direction of selling gas appliances upon hire purchase terms, which activity runs away with a good deal of money. There is usually something which is urgently requiring attention on the works or on the district, and as a result the Holding Company has to tackle these matters. At the same time there is no reason to fear that wise expenditure will not be productive and that the money will not return in the form of increased profits in years to come.

Mr. Smith refers to the advantages which can be gained and the savings made by closing down gas-works and linking up with a large undertaking. Where practicable this is very advantageous and it was stated in the Paper that a good deal in this direction was already being done. In my brief spoken reply, I stated that I agreed with Mr. Smith that the best form of amalgamation was for the large undertakings to absorb their adjoining small neighbours. This is a natural and economic development which cannot be bettered.

Consumer Service

by
R. N. LeFEVRE
(Officer in Charge of Training, Gas Light and Coke Company)

Communication No. 159

Mr. J. H. CURRIE (London) wrote: I am interested in the Gas Industry both as an engineer, an educationist, and a consumer of gas, and I was gratified to note that Mr. LeFevre emphasized the importance of the training of personnel, which to my mind is of paramount importance in the Gas Industry in its relationship to the public. The gas fitter deals with persons as well as with things, and all of us who have been trained in industry and who have had experience with people, realize that dealing with people is a very different problem from dealing with materials. Consequently the training of personnel in the Gas Industry is at least of equal importance to what is commonly called technical training. To my mind the success of modern industry is bound up with the personal element just as much as, if not more than, it was in the days before mechanization; and with regard to the typical gas fitter, mechanization probably affects him less than other types of craftsman. In the Gas Industry the necessity has to be faced of making the fullest use of scientific knowledge regarding gas manufacture and distribution, and at the same time maintaining an intimate relationship with the public regarding domestic service in addition to industrial applications.

I cordially endorse the Author's views regarding the importance of satisfactory Consumer Service as being at least one of the most important factors in the success of the Gas Industry.

Mr. R. T. D'EYNCOURT (London) wrote: Having previously been a member of the Watson House staff and an assistant to Mr. LeFevre, I am perhaps in a better position to appreciate more fully the work that has gone to create the organization so ably described in his most comprehensive Paper, and to congratulate him on what will surely become a standard book of reference for all undertakings interested in the vital subject of "Consumer Service."

There is one point, however, to which no reference was made in the discussion, and which perhaps warrants some comment. The Author refers to specialization by maintenance fitters as a matter depending on the size of the undertaking—that is, presumably, on an adequate number of similar appliances sufficient to give full-time employment in a compact area. No mention is made, however, of two other important factors bearing on this subject.

In the first place, do such specialists warrant the additional cost involved in the high percentage of "walking time," and secondly and far more important, does their work justify the surprise and annoyance caused to consumers by the fact that the one man is apparently incapable of undertaking even the simplest of other maintenance work should it fall outside the immediate scope of his determined duties? To my personal knowledge the invasion of armies of fitters is a definite disservice to consumers of all types, and therefore a practice which should be avoided wherever possible.

The Author's Reply.

Mr. R. N. LEFEVRE, in reply, wrote: The Paper was intended to cover broadly the general technical aspects of good consumer service. The fact that the trend of the discussion was mainly towards training indicates the importance of qualified personnel as the first step in any scheme for establishing a service organization. Since presenting this Paper I have presented a somewhat similar Paper to the 3rd International Gas Conference and the same views were expressed by continental gas engineers whose consumer service work is largely in the hands of contractors. In the long run it does not matter greatly who installs and services gas appliances provided that whoever does the work thoroughly understands his job.

Colonel French refers to the close co-operation which exists between his Department and the Institution. My criticism must not be misconstrued as reflecting in any way upon the excellent work which his Department has

done and is still doing in providing a basic training and examination scheme for gas fitters all over the country. Generally speaking the Gas Fitting Course remains the most satisfactory means of teaching the young employee the general principles of his trade. My remarks refer only to the need for bringing the Course more nearly in phase with the average trainee's progress in his daily work with his gas undertaking.

Mr. C. H. Rendell omitted to say that it was chiefly due to his effort and foresight that the training scheme of the Gas Light and Coke Company, as we know it to-day, came into being.

Mr. Spinks raised interesting points concerning part-time education and refresher courses. I agree with him entirely in regard to the former. Evening classes should commence as early as possible so as to finish at a reasonable hour. He is perhaps more fortunate in Birmingham in having his depôts fairly near to the Technical College. In London we have acute travelling difficulties at rush-hour periods, and, in spite of there being in and around our area of supply 12 Technical Institutes conducting approved gas courses, there remain many students who both reside and work at a considerable distance from an Institute. The same problem confronts the small Undertakings serving towns which do not possess a Technical Institute. One can only admire the keenness of their students who travel many miles to the nearest town offering the necessary facilities for classes. It is such students who might be better catered for by full-time courses at regional training centres.

The second point raised by Mr. Spinks is one with which all educationalists will agree. Training, like medicine, should be given in small regular doses. To make the patient swallow the whole bottle at once may have the reverse of the desired effect. The duration of our training courses at Watson House is one of the disadvantages of our size. To bring in hundreds of men for, say, one afternoon each week or fortnight from all parts of an area 60 miles in breadth would create an insurmountable problem with regard to labour organization.

Dr. Long refers to what I regard as one of the most important items of training—the customer relations side of a gas fitter's work. Mr. Currie writes also on the same subject. A considerable part of each of our syllabuses at Watson House is devoted to inculcating into trainees the right spirit in which they should go about their work. Good manners, respect of customers' property, clean appearance—in fact, a general pride in their work—are equally as important as technical knowledge and manipulative skill.

Mr. Critchley's disagreement with my statement regarding the importance of the foreman arises, I think, only with regard to the name. I used the word "foreman" in its generally accepted sense so as to be applicable to the majority of gas undertakings. The designation requirements and capabilities of the rank naturally vary with the size of the undertaking.

No one appreciates more than I do the warning uttered by Dr. Burness with regard to modifying existing courses to suit the special requirements of a large undertaking. The smaller the undertaking, the wider must be the knowledge possessed by the limited number of individuals it employs, and for these the existing courses are admirably suited. The fact remains, however, that over 50 per cent. of the students are provided by the larger undertakings and are, in the main, trainee-specialists.

Mr. Dean Chandler speaks with the authority of many years of experience of the value of the highest quality of appliances, material, and personnel in giving good service to the public. I am indebted to him for his kind remarks.

Mr. Tennyson d'Eyncourt has unfortunately experienced one of those rare coincidences which occur when several specialist maintenance men arrive at the same address simultaneously. The system does, however, permit of maintenance being carried out on mass-production lines and, as such, is economical in built-up areas. As men become fully trained in all branches of maintenance, work some modification in the system may be made. It must be remembered, though, that while certain appliances are serviced annually some are overhauled 2 and 3 times each year. Also, the season for maintenance varies with the type of appliance.

I should like to take this opportunity of thanking many others—including, in particular, Mr. Clifford E. Paige, President of the Brooklyn Union Gas Company, New York—who have written to me direct.

I regret that time did not permit of our hearing the views of the small undertakings with regard to training. I am under no misapprehension as to the difficulties of applying such a scheme as that of my Company to the small undertakings and I realize at the same time that the scheme I have described is far from perfect, even as far as the requirements of the Gas Light and Coke Company and Associated Companies are concerned.

The Consolidation of Gas

by
C. F. BROADHEAD
(Engineer, Metropolitan Gas Company of Melbourne, Australia)

Communication No. 153

Mr. E. W. SHARMAN (Leicester) wrote: The purification of gas by means of oxide of iron placed in towers would appear to offer to congested works a means of obtaining maximum purifier capacity with minimum ground area. Furthermore, the reduction in the time required for changing the oxide receptacles is a consideration that warrants investigation.

In general practice one finds that it is not only on account of a falling off in the activity of the oxide that a purifier change becomes necessary, but that the occurrence of an increasing differential pressure determines the need of the change. How is it proposed to deal with the question of such back pressure if the oxide is not to be removed from the steel containers when the necessity for revivification is indicated?

Consideration has been given to the tower system of oxide purification in this country, but whereas in Germany, where such a plant is working satisfactorily, the hydrogen sulphide content of the gas is found not to exceed 300 to 400 grains per 100 cu.ft., it was felt that in this country with the amounts of hydrogen sulphide varying from 500 grains with straight coal gas to 1,000 grains with coke oven gas, great difficulty would be experienced when opening up the towers in order to remove the spent oxide. It will be interesting to learn the hydrogen sulphide content of the gas at Melbourne.

With regard to the nature of the oxide in use, gas-works are more fortunate in this country in that oxides are available which without any preliminary mixing can be worked up to a minimum sulphur content of 50 per cent. in not more than two foulings.

The Author's Reply.

Mr. C. F. BROADHEAD, in reply, wrote: I desire, in the first place, to thank Dr. Smith for his kind reference to the Melbourne Undertaking in general and the complete gasification work in particular. I am unable, however, to view Dr. Smith's remarks about the selling side of the petroleum industry as parallel to conditions pertaining to the Gas Industry, and it is certain that the information given relating to the potential increases of gas and coke consumption by the poor domestic consumer, even if correct in England, is by no means on all fours with the position in Australia.

In discussing the major question of complete gasification, Dr. Smith says he does not believe that there will be any trouble as regards the coke markets for 10 or 20 years, but that complete gasification is coming and has to be developed as quickly as possible to-day, a statement which may be characterized as pious hope accompanied by nervous apprehension.

Dr. Smith states a purely hypothetical case in connection with the production of brown coal briquettes and electricity in Melbourne, based on entirely wrong premises, and proceeds to deduce that all kinds of things may happen which might assist me, in spite of myself, in getting matters in proper focus. Perhaps a reasonable suggestion would be that Members should study the Paper and the contributions to the discussion and decide for themselves where the proper focus and correct perspective are to be obtained.

In any case it is reassuring to have Dr. Smith's statement that for very good reasons we are going to continue to use water gas in the Industry and that the place of complete gasification is as an alternative to semi-carburetted water gas. Probably long before twenty years have passed his views will be as completely up-to-date as mine.

I am indebted to Mr. R. W. Hunter for his compli-

(Concluded on p. 1012.)

Electrolytic Corrosion of Gas Mains

An International Gas Union Paper

Mr. H. C. WIDLAKE.

by

H. C. WIDLAKE

(of the Plymouth and Stonehouse Gas Light and Coke Company)

In the course of this Paper to the Third International Gas Conference, details of which were published in last week's "JOURNAL," the Author points to the distinction between electrolysis—a gradual and insidious process—and fusion—which is generally rapid and occurs at a point. He goes on to discuss protective measures with particular reference to electrical drainage (earthing) and suitable pipe coverings.

Damage to gas pipes and services caused by the destructive action of vagabond currents may be fairly described as one of the most evasive and unsatisfactory problems with which gas engineers have ever been confronted.

The primary cause of such injury lies outside the control of the gas undertakers and any remedial measures which may be applied can only be of a defensive nature inasmuch as the actual cause of the damage cannot, under present conditions of public transport services, be entirely eliminated.

Reference to early records leads one to the conclusion that even in days when practical experience was entirely lacking and definite knowledge on the subject was very meagre, gas officials as a whole became apprehensive when electric street railway systems made their appearance in their areas of supply.

The overhead trolley system, using the uninsulated track for the return of the current to the source of supply, offered a means of public transport at a reasonable cost of about £4,000 to £6,000 per mile of single track.

The alternative system in which both positive and negative conductors were insulated throughout was, by comparison, enormously expensive and consequently lay beyond the financial means of any but the largest municipalities.

Early Apprehensions.

With the track return system, it is unavoidable that some proportion of the current flowing in the rails should desert the track in favour of other parallel paths of flow, and from the early days of these enterprises there is ample evidence on record to show that gas engineers had an uneasy feeling that their own mains might offer a hospitable path for the accommodation of these nomadic currents. Out of a host of painstaking investigations carried out over a number of years, three vital facts have emerged—namely:

(1) That vagrant currents are responsible for serious and continuous damage to gas mains.
(2) That no legislative measures covering the operation of street tramway systems using an earth return can adequately protect buried pipes from electrolytic damage.
(3) That any remedial measures applied by gas undertakers must take a protective form rather than any attempt to suppress the evil at its source.

The position as it exists to-day is well summarized by the following extract from the 1st Report of the Corrosion of Pipes Sub-Committee of The Institution of Gas Engineers[1]:

"It is now generally accepted that corrosion at atmospheric temperature is a galvanic phenomenon. It occurs at points where electric current passes from the metal into some conducting liquid, usually an aqueous solution. The electromotive force may arise from the chemical energy of the metal itself (in which case it is small—of the order of a volt) or it may be supplied from an external source, as in the case of electrolysis by stray currents. In this case the electromotive force may be large, and corrosion correspondingly rapid."

Source of Damage.

The current responsible for electrolytic damage to buried pipes arises from the working of street tramway or electric railway systems in which the track on which the cars run is used as a medium for the return of the current to the point of supply, and in a lesser degree to vagrant earth currents caused by some irregularity in the working of a public electricity supply system.

Throughout this Paper reference will be made to street tramways as the source from which vagrant earth currents can arise. It must be remembered, however, that all remarks made in this connection apply with equal force to electric railways working on the direct current system, and using the track as an uninsulated return to the source of supply. It is true that the ordinary railway metals do not lie in that close contact with the ground as do tramway metals, but they cannot be considered as insulated from the general mass of the soil and a suburban electric train, with its large power units and rapid acceleration, is capable of doing as much harm to buried plant in the district through which the route runs as is a fair-sized tramway system.

Electrolytic trouble due to the working of a public electricity supply system is relatively small as, if a public supply is operated under proper technical control, such faults must necessarily be of short duration and, what is more, any damage to gas pipes is far more likely to be caused by fusion than by electrolysis.

In this connection it is important that a sharp distinction should be drawn between electrolytic damage and damage caused by fusion.

Fusion.

Fusion generally takes place as the result of a disturbance on an adjacent electric system, and the actual damage is caused by the heavy short-circuit current which traverses the gas pipe in its quest for a low resistance path to earth. Regulations governing the supply and uses of electricity anticipate such occurrences, and demand that certain clearly defined provisions shall be made for the safe conduct to earth of such short-circuiting currents. When, however, this provision is not made, or, being made, has become inoperative through breakage or corrosion of connections, it often happens that a short-circuit current finds an easy path to earth at a point where the cable sheath or conduit happens to be making contact with a gas or water pipe. Fusion takes place at that point of contact, and the wall of the pipe is pierced by the electric arc set up by the passage of the current. This damage generally occurs in a fraction of a second, and leaves unmistakable evidence of the manner in which it has been caused.

Electrolysis, on the other hand, is a very gradual, insidious process, and the very slowness with which it proceeds, undetected, is responsible for the fact that many Gas Undertakings imagine themselves to be immune from this particular trouble. As a matter of fact, they are by no means immune, but the deterioration of mains which has been going on for years does not happen to have

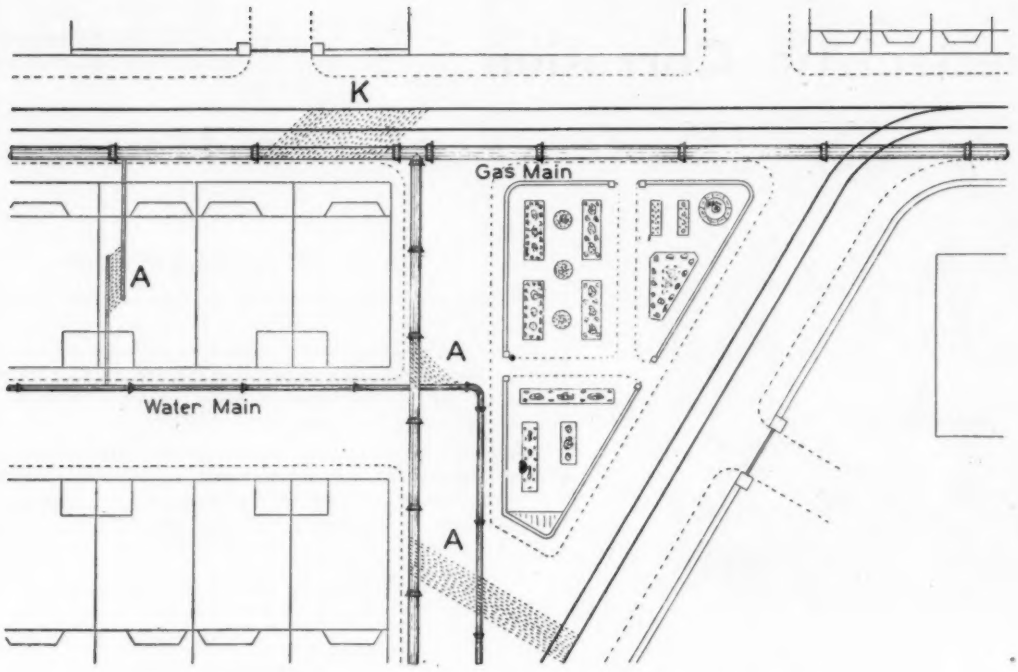


Fig. 1.—Gas and Water Mains Lying Between Two Branches of a Tramway System.

reached that point when the presence of the canker becomes obvious.

On a well bonded and well maintained street tramway system as much as 10 to 15% of the total current may leave (and ultimately return to) the track in its search for alternative paths, and, conversely, on a poorly installed system, and particularly where an old horse-drawn track has been converted for electrical working, as much as 60 to 70% of the total current may seek alternative paths, and cause infinite damage to any buried pipes through which it may flow.

It will be appreciated that in the case of an ordinary tramway and a gas distribution system a considerable mileage of track and junctions, and of gas and water mains, must necessarily be involved, and, moreover, the presence of multiple negative feeder routes, connecting various parts of the track to the source of supply, leads to a corresponding increase in the number of areas where electrolytic damage in an acute form will be prevalent.

The manner in which joints in a gas main are made would lead one to suppose that the electrical resistance of (say) a 30 ft. length of 4 in. pipe would be very much the same as that of an equal length made up of two 15 ft. pieces jointed together in the usual way. Actually, this is far from correct. A test recently made by the Author on a length of 4 in. steel main which had been in the ground about four years showed that the electrical resistance of the joints was 250 times the resistance per foot length of the plain tube Thus the current passing along the main tends to " shunt " itself across the joints due to the increased resistance of the main at those points.

Fig. 1 shows a network of gas and water mains covering an area which happens to lie between two branches of a tramway system. A difference of electrical potential will exist between the two routes, the extent of that difference varying according to the distance from the junction and the amount of car traffic on the routes. This difference of potential will cause a current to flow, and the district lying in the angle formed by the divergence of the two routes will be traversed by ground currents, the flow of which will be materially assisted by whatever gas or water mains may be buried in that area.

A generally cathodic area exists at the position marked K on one of the branch tracks where a stray current enters an adjacent gas main. After traversing that main for some distance a water main may offer a more attractive path, and the current or some proportion of it may transfer itself to that main, only to cross again to a gas main a little further on. Finally, the current will desert both gas and water mains to return to the other branch of the track after having divided itself in definite quantities along every gas and water main in the area shown.

Points at which gas mains have suffered damage by electrolytic action are marked A, A, A, &c.

Particular attention is drawn to such a point lying within a consumer's premises where a flow of vagrant current is established between a gas and water service.

At every point of transfer from one service to another, electrolytic damage will occur where the current leaves the main, and after a time that district will be particularly noted by both gas and water suppliers as an area in which, for some obscure reason, the mains and services have a relatively short life.

Loss to Gas Undertakings.

It is impossible to state in even approximate terms the annual loss which gas undertakings suffer by electrolytic damage to mains and services, but it is very certain that such damage is far more prevalent than is generally believed.

When, following an escape of gas, it is found that some portion of a main is badly wasted, that condition, even to-day, is often attributed to soil corrosion or to some vague metallurgical defect in the structure of the pipe, whereas in many cases the injury is due to the presence of vagabond currents.

In an able Paper presented by H. Sarrade[2] before the 50th French Gas Congress, 1927, the author remarked:

" In the case of the Sté d'Eclairage Chauffage et Force Motrice, whose distribution system extends throughout the suburbs of Paris, where the tramway systems have never ceased developing, the study of the cause and effect of the phenomenon of electrolysis of mains has always been a matter of great importance, but of recent years the problem has become really serious. The gravity of the question may be gauged by the following facts. Between 1910 and 1926, excluding the period of the war, during which observations of electrolysis were necessarily abandoned—that is to say, in twelve years—9,600 m. (10,500 yd.) of 80 to 600 mm. (3·1 to 23·4 in.) pipe and about 1,100 lead service pipes were put completely out of action and had to be replaced. These figures relate to cases definitely proved against electrolysis; and for these the gas undertakings have received by way of damages over 900,000 frs.

" One has, of course, to realize that the harm done by stray tramway currents is not confined to the gas pipes, but has equally bad effects on all other conduits; and one can easily picture the systematic opposition which the tramway undertakings put up in discussing what amounted to a serious public danger. Since 1921 the electric cables of eight different undertakings have been linked up, and this has facilitated the taking of protective measures and records by the E.C.F.M. As a result, the Company have had the satisfaction of witnessing the improvement of a situation which they considered critical. Their experience

has shown that in the case of well laid lines normally 12 to 30% of the return current may find its way through the earth to pipes in the vicinity. In some cases, however, they have come across as much as 60%, usually when old horse tramlines have been converted to electricity without adequate arrangements being made for the return circuit."

It will be noted that this represents the experience of only one large gas undertaking in relation to damage which is definitely known to have been caused by electrolysis and in all probability represents but a small portion of the loss caused by undiscovered electrolytic deterioration over the period named.

C. M. Longfield,[3] in a Paper presented in 1935 before the Institution of Electrical Engineers, commented upon the various reactions and extraneous influences which had to be taken into account when computing the decomposition of metal by Faraday's Law, but it is generally accepted that a current of one ampere flowing for one year will decompose approximately 15 to 20 lb. of cast iron and 60 to 70 lb. of lead.

A large provincial tramway system serving a hilly district may easily be loaded to 1,500 to 2,000 amperes, and when it is remembered that an appreciable proportion of that current will leave the tracks for such other metallic path as may offer easy alternative routes, the potential possibilities of damage by the action of vagrant currents will be appreciated.

Attempts to Minimize Suggested Damage.

Efforts have often been made by interested parties to minimize the damage which buried pipes are stated to suffer by setting up an arithmetical comparison between the magnitude of the vagrant currents and the total area of the mains. This argument is entirely fallacious, in that it assumes a condition of uniform conductivity between the mains and the soil in which they are laid. Such a condition is purely theoretical and can never exist in fact; the conductivity of the soil and its electrical contact with the area of the pipe varies greatly, and this condition leads to localized attack at points of the greatest conductivity.

The foregoing, considered by the reader in the light of his own particular knowledge of the gas main and tramway topography of his own particular town, will serve to give some idea of the devious routes which vagabond currents will follow in their search for paths of least resistance, and the consequent damage which can be suffered by buried plant.

A question which must naturally arise concerns the degree of relief which could be obtained by bringing pressure to bear upon street railway operators with a view to eliminating or at least substantially reducing the magnitude of the stray currents.

In both survey work and the setting up of defensive measures a good working understanding and co-operation with the tramway operators is of the utmost importance, but so long as these operators are working reasonably within the statutory limits governing earth currents, the gas undertakers are entirely at their mercy.

It is true that public opinion might, to some extent be roused in an extreme case where the safety of a vital public utility service was seriously prejudiced by the working of a street tramway system, but it must be recognized that there is an economic limit to the extent to which public opinion can be invoked, and that there must be a tendency to accept such conditions as a necessary evil, a price to be paid for two modern services whose interests are technically antagonistic.

In the case of a municipality owning gas, water, and tramway undertakings, the position is somewhat easier, as no public body would tolerate a position in which the property of one department was being ruined by the working of another.

An ultimate hope of relief lies in the growing tendency to replace rail-bound vehicles with electric trolley or internal combustion engined omnibuses, and when such a change-over is accomplished, serious electrolytic damage will be practically a thing of the past, and gas undertakers will be left with a heritage of mains which, having deteriorated as the result of attack by vagrant currents, are probably more susceptible to the effects of soil corrosion than might otherwise be the case.

Vagaries of Stray Currents.

The term " stray " as applied to earth currents is used rather loosely since an electric current cannot stray in that same sense as can a lost child or an animal, wandering about aimlessly and without any definite objective. One of the fundamental laws governing the flow of an electric current is that it will invariably select the path of lowest resistance. Its sole objective is its source, which may be an electric generator or a battery.

If more than one path offers the current will divide itself with unerring precision over as many paths as are available and the amount of flow in each path will be exactly proportionate to the resistance of that path.

In testing for the presence of vagrant currents evidence of flows will be found in the most unlikely places; current of considerable magnitude will be found where only small flows might be reasonably anticipated, and, conversely, minute currents will exist at points where the relative position of gas mains, water mains, and electrified track would suggest the presence of substantial currents.

One of the most perplexing conditions met by the investigator lies in the rapid changes which take place in the magnitude and direction of currents over relatively short distances. Given points will prove to be alternately anodic and cathodic in sympathy with variations of tramway load and with traffic conditions generally.

An impression exists that areas which are consistently cathodic—namely, where the main is negative to the direction of flow—are immune from damage. This reflection is only correct if one's conception of an area is extremely restricted; actually its effect is to create a fallacious sense of security.

If vagabond current enters a main at a certain point, it is obvious that it will desert the main at some other point where anodic destruction will occur.

It is a significant fact that heavy cathodic points are found near areas known to be subjected to serious and consistent corrosion. This condition is referred to by Jeavons and Pinnock[4] in their valuable report on the field work carried out in the Staffordshire district of the Mond Gas Company. In this report, following a comprehensive analysis of the various points on the area in which serious corrosion of mains was prevalent and of the electrical conditions at those points, the Authors make this significant comment:

" Reviewing all known cases of corrosion, in 95% of the cases the main is anodic . . . such an extraordinary number of results all pointing in the same direction cannot possibly be accidental and this is the main evidence on which we base our opinion that in nearly every case our corrosion troubles are electrolytic."

The work carried out by these Authors was peculiarly complete in that it covered not only the most painstaking and thorough investigation of the responsible electrical conditions but also the setting up of protective measures which have eliminated conditions that were a grave menace to personal safety and financial prosperity.

A peculiar circumstance bearing upon the subject of electrolytic damage has been investigated by J. Chappuis,[5] of Paris, and goes a long way to explain the many cases of accelerated damage under unchanging conditions of potential difference. Chappuis's experiments and experience lead him to believe that in the course of flow of a vagrant current the particles of metal detached from a main result in the soil becoming metallized with a corresponding increase in the conductivity of that particular path. In other words, a kind of metallic chain is formed between the two electrodes, and the current flow is increased accordingly. If this condition, which has been proved by laboratory experiments, does actually exist, it explains why new pipes laid to replace those attacked by vagrant currents last for a far shorter time than the originals.

It has been suggested that if street tramway operators were put under a statutory obligation to reverse the polarity of their traction feeders at frequent regular intervals, the destructive effect of these vagrant currents would be largely diminished. A. Bolzinger,[6] in a report submitted to his Board, comments upon this theory in the following terms:

" If the phenomenon of electrolysis were perfectly reversible—that is to say, if by changing the direction of the current the corroded metal regained its nature and became part of the pipe—one could periodically change the polarity of the trolley rail. Such reversibility is far from perfect, and experiments carried out by the Bureau of Standards at Washington have shown that if a current is reversed for 24 hours the corrosion of iron pipes is diminished by three-quarters. In the case of lead pipes, the current must be reversed far more often to reduce the corrosion by only 50%."

These conclusions suggest that there is some element of reversibility in electrolytic phenomena, and that a change of flow has the power of re-depositing the particles of metal detached from a main.

One cannot help wondering if the Washington experiments were carried out over a sufficiently long period or whether the results were obscured by some secondary phenomena.

(To be continued.)

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City and Guilds of London Institute Examinations

The following questions were set in the City and Guilds of London Institute Examinations for 1937 in the subjects named.

(*Concluded from p. 873.*)

GAS FITTING.

FINAL.—WRITTEN PAPER.

Monday, April 26, 7 to 10 p.m.

(Not more than six questions are to be attempted, of which not more than two may be chosen from each Section. The maximum number of marks obtainable is the same for each question.)

SECTION A.

(Select not more than two of the following three questions.)

1. Give very concisely two reasons in favour of and two reasons against the use of each of the following tools for cutting wrought iron and mild steel tubes up to 1-in. size:

(*a*) 3-wheel tube cutters.
(*b*) Hacksaw.

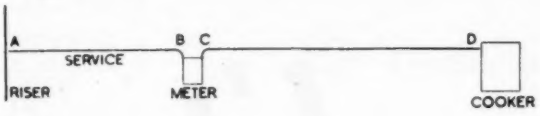


FIG. 1
(QUESTION 3)

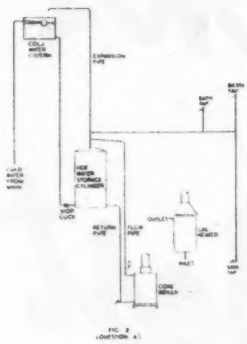


FIG. 2
(QUESTION 4)

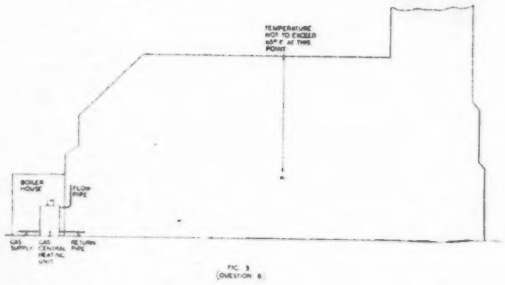


FIG. 3
(QUESTION 6)

2. The most important operations in exchanging a large by-passed meter are as follows:

(*a*) Test for correct registration on full load.
(*b*) Close inlet valve.
(*c*) See that all appliances are turned off.
(*d*) Open inlet valve.
(*e*) Expel air.
(*f*) Close outlet valve.
(*g*) Test for soundness with pressure gauge.
(*h*) Close by-pass valve.
(*i*) Test for registration on small load.
(*j*) Open outlet valve.
(*k*) Open by-pass valve.

By means of the letters (there is no need to write the words) make a list showing the order in which you would carry out this work.

3. Fig. 1 on the attached sheet is a diagram indicating the layout of the gas supply to a cooker in a small flat.

A constant pressure of 4-in. water column is maintained in the riser at point A and the pipes and meter are of adequate size considering the lengths and the load.

State, in the form of a table, what the pressures at points B, C, and D should be when:

(*a*) The cooker is turned off.
(*b*) The cooker is in use.
(*c*) The cooker is in use and a constant pressure governor set at 3-in. water column is fitted at the meter inlet B.

SECTION B

(Select not more than two of the following three questions.)

4. Fig. 2 on the attached sheet shows the hot-water installation in a small house.

(i.) By means of pencil lines on the sketch show the manner in which you would connect up the instantaneous multipoint gas water heater, to act as an alternative, as required, to the coke boiler.
(ii.) Indicate, in their correct locations, and name any valves or other special fittings you would use.
(iii.) Detach the diagram and attach it to your answer book.

5. Write explanatory notes on any five of the following terms used in gas water heating practice:

(*a*) Circulation restrictor.
(*b*) Head of water.
(*c*) Quick-acting thermostat.
(*d*) Stratification.
(*e*) Maintenance gas rate.
(*f*) Recovery rate.
(*g*) Inter-circulation.

6. A church is heated by a gas-fired central heating unit. It is desired to effect the following methods of control:

(i.) The gas to shut down to by-pass when the temperature in the centre of the church reaches 65° F.
(ii.) The gas supply to shut down if the return water reaches a temperature above 90° F.
(iii.) The central heating unit to start up at 7 a.m. and shut down at 4 p.m. daily, and automatically, in conjunction with both (i.) and (ii.) above.
(*a*) By means of pencil lines and lettering on the sketch (fig. 3) show what you consider to be the simplest method of carrying out the desired control.
(*b*) Attach the completed diagram to your answer book.

SECTION C.

(Select not more than two of the following three questions.)

7. (*a*) Make a freehand line sketch in pencil, approximately full-size, of either:

(i.) The vertical cross-section of a 1-in. pressure-operated safety cut-off valve,

or

(ii.) The vertical cross-section of a 1½-in. non-return (back pressure) valve.

(*b*) Letter each important part of your sketch.
(*c*) Make a list below your sketch showing the name of the part to which each letter refers.

8. Answer very briefly any three of the following questions.

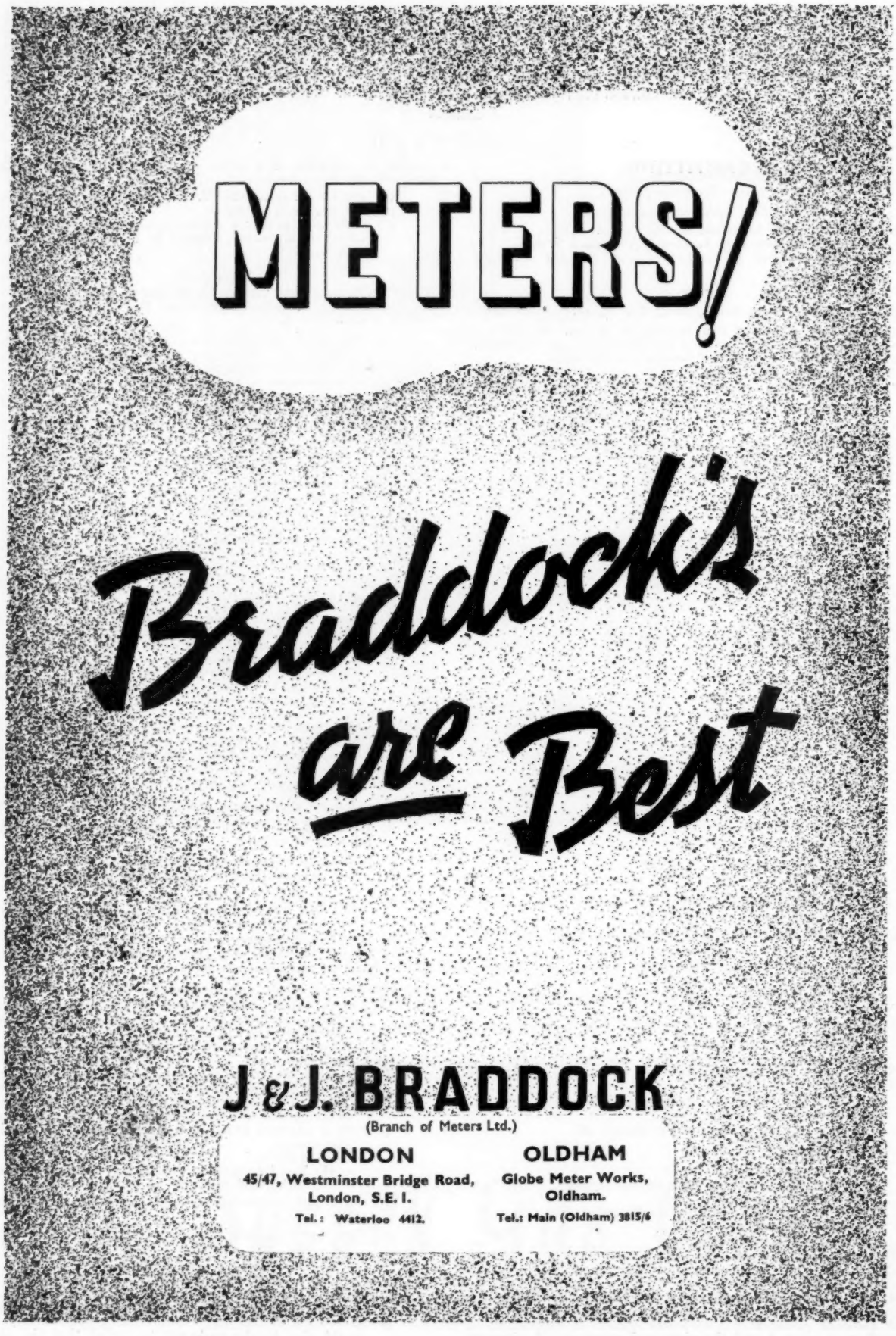
(i.) State three possible causes of the filament of the electro-catalytic lighter of a gas fire failing to glow when the tap is turned on.
(ii.) Why is it imperative to lute the frame of a panel type gas fire?
(iii.) State what you consider to be the three most important considerations, from the customer-service point of view, to be observed by a fitter when carrying out the maintenance service of a gas fire.
(iv.) On a radiator fitted in a cinema foyer, how would you ensure
(*a*) Rigidity?
(*b*) Non-interference with the gas supply by unauthorized persons?

9. You have just connected up and assembled a new gas refrigerator.

(*a*) State very concisely how you would ensure that:

(i.) The cabinet is level.
(ii.) The cabinet remains rigid.
(iii.) The gas rate is correct.
(iv.) The refrigerating unit is operating correctly.
(v.) The thermostat is in good order mechanically.

(*b*) Give a list of four important working hints that you would give to the customer to ensure that she obtained the best results from the refrigerator.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GAS FITTING.

FINAL.—PRACTICAL EXAMINATION.

(Four hours allowed for this Examination. Candidates must attempt all the tests.)

The following materials to be supplied to each candidate:

One 2-in. brass union (lead to British Standard Pipe thread).
One 6-in. length of 2-in. lead pipe (gas weight).
One 6-ft. length of 1-in. lead pipe (gas weight).
One 6-ft. length of ½-in. brass or copper tubing (17 gauge, fully annealed and polished).
One 6-ft. length of ¾ in. wrought iron or mild steel tubing (steam weight).
Two ¾-in. elbows.
One ¾-in. cap.
One ¾-in. by ¼-in. by ¼-in. tee.
Two ¼-in. teat cocks.

1. Make a blown soldered joint between the 2-in. brass union and the 2-in. lead pipe in the manner, and to the dimensions, shown in fig. 1. *(Time allowed, 20 min.: 10 marks.)*

2. Bend the 1-in. lead pipe and cut it to the dimensions shown in fig. 2.

You may, if you wish, use springs, bobbins, and followers. *(Time allowed, 1 hr. 10 min.: 30 marks.)*

3. Bend, cut, and screw the brass or copper tubing to the dimensions shown in fig. 3.

Apart from stocks and dies and files, no tools of any kind are to be used. *(Time allowed, ¾ hr.: 20 marks.)*

4. With the tubing and fittings provided, make up the set piece in the manner, and to the dimensions, shown in fig. 4. *(Time allowed, 1¾ hr.: 40 marks.)*

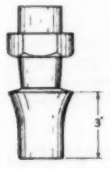


FIG. 1
QUESTION 1

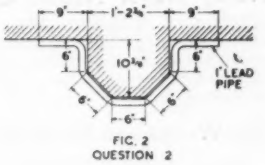


FIG. 2
QUESTION 2

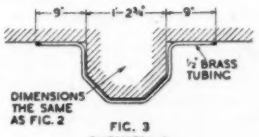


FIG. 3
QUESTION 3

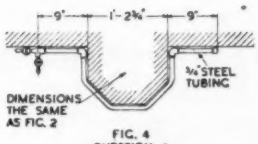


FIG. 4
QUESTION 4

NOTE.—The shape around which the bending is to be made represents a stanchion or supporting column in a building and is similar for all of the three tests—Nos. 2, 3, and 4.

Gas Undertakings' Results

Aberdeen.

Coal supplies for Aberdeen Corporation Gas Department will cost during the coming year roughly 2s. 5d. a ton more than in the past year. It was reported to the Gas Committee on June 22 that Mr. Samuel Milne, the Gas Engineer, had fixed contracts for the supply of 92,950 tons at a cost of £122,489, which works out at 26s. 4·27d. a ton as compared with 23s. 11·89d. for the past year. During May the total quantity of gas made was 1,863,000 cu.ft. more than a year ago. The statement for the whole year to the end of May showed substantial increases under all headings. The quantity of gas made has been 1,876,340,000 cu.ft.—an increase of 34,219,000 on the previous year—while the sale of coke shows an increase of 7,242 tons. Revenue from coke, £57,294, is up by £9,772, and that from tar products and ammoniacal liquor amounts to £18,257—an increase of £241.

Brighouse.

The gas sent out during the year by the Brighouse Gas Department amounted to 249,060,000 cu.ft., being 4,171,000 cu.ft. more than that of last year, an increase of 1·7%. The gas sold and used is shown as 236,300,200 cu.ft., or 200,700 cu.ft. increase on the preceding year, equal to 0·08%. The gas unaccounted-for is 12,759,800 cu.ft., which represents 5·12% of the output. An adjustment to this figure is necessary owing to there being a larger number of prepayment meters unemptied on March 31, 1937, than at the corresponding date of the previous year. The effect of this adjustment will be to reduce the unaccounted-for gas to 9,481,200 cu.ft., or 3·8% of the output. The average make of gas per ton of coal carbonized was 14,083 cu.ft. inclusive of the equivalent for benzole extraction of 837 cu.ft. Residuals have yielded 79·3% of the cost of the coal as against 73·6% in the previous year. The new benzole washing and distillation plant has been put into operation and is working satisfactorily. The reorganization of the stores department is proceeding and the new mechanics' shop is almost ready for occupation.

Bury.

The report of the Engineer and Manager of the Bury Gas Department, Mr. W. H. Battersby, states that the gas made for the year was 479,230,000 cu.ft. and the gas sent out was 479,432,000 cu.ft. Coal carbonized during the year was 26,517 tons, the yield per ton being 18,072 cu.ft. This figure is the highest yield of gas per ton of coal obtained at Bury, and is an increase of 78 cu.ft. per ton over last year, resulting in a saving of 1,250 tons of coal on the year's working.

Gas Consolidation, Ltd.

Net revenue amounting to £24,745, after providing for loan interest and other expenses, including taxation, was earned during the year ended May 31, 1937, by Gas Consolidation, Ltd. After adding £1,748 brought forward from last year and deducting the preference dividend for the year and the interim dividends paid on Dec. 1, 1936, on the "A" and "B" ordinary shares, a balance of £13,776 remained available for distribution. The Directors recommend a final dividend of 2½%, less tax, on the "A" ordinary shares making with the dividend already paid a total dividend for the year at the rate of 5%, less tax, and a final dividend of 3½%, less tax, on the "B" ordinary shares, making with the interim dividend already paid a total dividend for the year at the rate of 5½%, less tax. The accounts show that the Company holds investments valued on the basis of cost at £823,052 in ten subsidiary gas supply undertakings, and it also holds other investments valued at £133,846, including 99,000 deferred shares in the Severn Valley Gas Corporation, Ltd. The Company has an issued capital of £693,895, divided into £250,000 4% redeemable cumulative preference shares, £193,895 "A" ordinary shares, and £250,000 "B" ordinary shares. In addition there is £250,000 3½% debenture stock outstanding.

Grangemouth.

The Grangemouth Gas Department for the year to May 15 last showed a balance of £1,175 on the year's working, which with a balance at the beginning of the year of £857, made a total of £2,032. Loans outstanding amounted to £15,481, the sum of £2,227 having been repaid during the past year. During the year capital expenditure on mains and service pipes, meters, cookers and vertical retorts amounted to £5,205. The erection of two vertical retorts had been completed at a cost of £2,358. In the near future it would appear that further capital expenditure would be necessary for an additional gasholder. Over 100 water heating appliances had been sold this year as compared with nine the previous year.

Oldham.

The gross revenue for the year of the Oldham Gas Department was £274,344 and the gross expenditure £214,177, leaving a credit balance of £60,156. Gas annuities, interest on loans and sinking fund charges amounted to £38,117, leaving a net profit of £22,039. Since 1934 the price of gas has been reduced by 5·4d. per 1,000 cu.ft. During the year there has been an increase in the wages paid and a substantial increase in the cost of materials. During the past four years the capital liability has been reduced from 11½d. per 1,000 cu.ft. to 8d.

Radcliffe.

The annual report of the Radcliffe and Little Lever Gas Board contains reference to a proposal to sell the undertaking to the United Kingdom Gas Corporation. The gross profit was £22,553 (a decrease of £1,750), and the net loss £661. The new financial year was begun with a debit balance of £75.

Rochdale.

Sales by the Rochdale Corporation Gas Department during the year ended March 31 show an increase of 3,750,000 cu.ft. compared with those of the previous year. There was a net surplus of £5,977 on the year's working, compared with £8,165 in 1935-6, the decrease being due to the fact that coal cost £1,500 more and wages £1,000 more. The reconstruction of the showrooms and the Department's progressive sales policy is reflected in an increase of £1,658 in the sales of appliances, although the benefit of the new showrooms was only enjoyed for a part of the year.

Trade Notes

Hurry Water Heater Company.

This firm announce that their occupation of new works is now completed, and all communications should henceforth be addressed to Armory Close, Little Green Lane, Bordesley Green, Birmingham, 9; 'phone: Victoria 0991; telegrams: "Hurro-Birmingham."

The Works and Products of Browett Lindley, Ltd.

We are obliged to Messrs. J. Browett Lindley (1931), Ltd., of Coborn Works, Dunham's Lane, Letchworth, for a copy of an interesting brochure entitled "Our Works and Products." This fully illustrated brochure was produced recently prior to a large extension scheme which is now nearing completion.

A Corrosion Preventing Paint.

A bituminous black paint which is sold under the name of "Presomet" is being marketed by Stephenson Clarke and Associated Companies, Ltd. (By-Products Department), 54, Bute Street, Cardiff. Among the advantages claimed for this product are its qualities in preserving all metals against rust, acids, sea water, &c.

Steel Fabrication.

The long experience which the Harland Engineering Company, Ltd., 74, Victoria Street, S.W. 1, have had in the manufacture of fabricated steel products and the acceptance which their work has met with in the market has encouraged the compilation of an illustrated pamphlet for the information of prospective buyers and other interested parties. Examples are given of the work of the Company in the fabrication of bedplates, &c.

Newbridge Cooker Lighter Modification.

The Horstmann Gear Company, Ltd., of Newbridge Works, Bath, have made an interesting announcement regarding their well-known cooker lighters. In future all such lighters will have an important extra safety feature, in respect of which patents are pending. The lighter is constructed so that it will only operate when pointing in a downward direction, thus eliminating any possibility of an accident should the button be pressed when the lighter is pointed upwards.

The firm state that these lighters are growing in popularity to a tremendous extent, and that they have already had to triplicate their production to cope with the demand.

Through Eight Reigns.

No fewer than eight monarchs have occupied the English Throne in the years since Messrs. Newton, Chambers' beginning in 1793, and a handsome brochure has been published by the firm to mark this enviable record—to which we referred in some detail in the issue of the "JOURNAL" for May 12 last. From a small foundry in Sheffield 144 years ago, Messrs. Newton, Chambers, & Co., Ltd., have grown into a huge organization, operating collieries, blast furnaces, coke ovens, engineering and chemical works, and the handful of employees in 1793 has become many thousands of workpeople to-day. Until 1934 a direct descendant of the original founders had always been Chairman, and to-day direct descendants still occupy seats on the Board of Directors.

A New Rust-Proof Paint.

An important problem in most large industries to-day is the protection of metal structures against rust, whether from the ravages of weather or corrosive vapours. For a long time red lead has been regarded as the most adequate protection for metals; but its drawbacks are considerable—chiefly the fact that it can only be applied to surfaces previously freed from all traces of rust, or which have not so far been exposed to the possibility of corrosion or oxidization.

There has recently appeared on the market a new and highly effective paint for combating rust. This paint, which is being sold by Messrs. Thos. Parsons & Sons, Ltd., of 315-317, Oxford Street, W. 1, under the name "Rust-Eeter," does not merely stand between the surface and corrosion; it actually reacts, explain the makers, on the rust itself in such a way as to transform it into an essential part of the protective coating. It is a paint with a basis of chlorinated rubber, which is well known for its powers of resistance to acids, alkalis, and mechanical processes, due to its extremely fine grain and excellent adhesive qualities. It is thus an invaluable protective coating for metals used in industries involving exposure to corrosive vapours, as also for those exposed to rain, mist, salt water, and other climatic conditions, such as bridges, docks, wireless masts, and corrugated iron structures.

Unlike red lead, this paint may be sprayed on as well as applied by brush. "Rust-Eeter" sets to the touch in less than twenty minutes, thus minimizing the chances of dust and foreign bodies adhering, and is completely dry within twenty-four hours. A gallon will cover 400 to 500 sq.ft. Single coats applied in 1932 and placed in unfavourable conditions were still undamaged in 1936, and no trace of corrosion could be detected.

Aluminium Welding.

This is the subject of a second of the new series of technical information booklets published by the British Oxygen Company, Ltd., of Thames House, Millbank, S.W. 1, and it is concerned with the welding of aluminium alloys by the oxy-acetylene blowpipe flame.

At the outset an indication is given of the reasons for alloying aluminium, and hence the need for aluminium alloy welding rods. The reason for alloying is to combine the low specific gravity, high thermal and electrical conductivity, great ductility, and malleability of the aluminium with the high tensile strength, hardness, and machineability of other commonly occurring metals. The booklet first describes the composition and mechanical properties of the various "Alda" aluminium welding rods supplied for the welding of aluminium, and then proceeds to outline where and how these rods may be applied.

Heat-Resisting Steels.

During recent years Messrs. Head, Wrightson, & Co., Ltd., of Thornaby-on-Tees, have developed three grades of heat-resisting steels, the use of which has resulted, it is claimed, in reduced expense through the ordinary saving in cost of material or the saving in maintenance labour, or both combined. The uses of the firm's steels are extensive, and designers having difficulty in selecting suitable heat-resisting material may with advantage consult their Research and Metallurgical Department.

In a brochure recently issued by the firm an outline is given of these grades of steel with technical details illustrating the physical and mechanical properties which will be of valuable assistance in deciding upon suitable steels to meet varying requirements. The firm also make castings in the following alloys: Manganese (austenitic and pearlitic), chromium and chromium molybdenum, molybdenum, nickel and nickel chromium, nickel chromium molybdenum, and stainless, as well as a wide range of carbon steels.

A New Multi Purpose Commercial Vehicle.

Designed and constructed by a Portsmouth firm—Messrs. J. H. Sparshatt & Sons, London Road, Hilsea, Portsmouth—a remarkable new development in Commercial Trucks is now being marketed by them in conjunction with Messrs. Dodge Brothers (Britain), Ltd. Constructed and to all appearances like an ordinary platform truck, this vehicle is capable of conversion at a moment's notice into a fully equipped fire engine.

The truck is built on to a 70 b.h.p. 3-ton Dodge long-wheelbase chassis and is so constructed that by a simple mechanism the platform of the truck is raised, thus disclosing a strong canvas tank capable of holding 600 gallons of liquid. The container can be filled either from a hydrant or pond, whichever is the more convenient. Underneath, the chassis is fitted with a powerful ejector pump, delivering 100 gallons per minute through two hoses at a pressure of 100 lb. per sq.in.

A demonstration of this vehicle was recently given at the Kew Works of Messrs. Dodge Brothers to prominent officials from the Home Office, War Office, Admiralty, and Air Force, who expressed considerable interest in its many uses. It will be obvious that such a truck would be of vital importance in the case of a national emergency, for by equipping industrial undertakings with a fleet of such trucks there would be available at very short notice a fully equipped vehicle for decontamination purposes in the event of poison gas or for fire-fighting to combat the effect of incendiary bombs. The makers claim that this truck should make a strong appeal to the Gas Industry, inasmuch as it can be used for general purpose carting work, for water and liquid carrying, and at the same time be available for instant use in case of fire.

The truck, complete with full equipment and hoses, is priced at £507—and is being marketed by Messrs. J. H. Sparshatt & Sons in conjunction with Dodge Brothers, the builders of the engine and chassis. The low price at which this vehicle is being sold should make it readily accessible to municipal authorities and industrial concerns and at the same time make a very real contribution towards National defence in case of emergency.

A Useful Gas Refrigerator Accessory.

Valuable as the refrigerator is for producing convenient little blocks of ice for cooling various fruits and drinks, there are certain beverages into which one cannot just drop a lump of ice in order to achieve this desirable end. The connoisseur would be horrified at the mere idea of putting such a diluting medium into his wine, his cocktail, or his whisky, while more homely folk prefer their tankard of beer without the flattening influence of melting ice. And the same applies to grape fruit and stewed fruits of various kinds—cooled, yes; but not by means of iced water introduced into them!

It may be argued that the obvious solution is to place the whole lot in the refrigerator for a suitable period before use; but there are many attendant drawbacks to such procedure, not least of which is that of space—at any rate, for those who cannot afford the larger types of cabinet. In addition, there is always the risk of over-cooling in certain circumstances. The problem has been solved in a very ingenious way by Messrs.

Lite-on Products, Ltd., of 160, New Cavendish Street, W. 1, who have devised a means of chilling without diluting and at the same time taking advantage of the services of the gas refrigerator to achieve this end in a very simple manner.

"Silverice" balls contain water, hermetically sealed, with a slight vacuum to provide for expansion and contraction. They may be used in any refrigerator which has a freezing chamber; it is only necessary to place the balls in the tray for about the length of time normally required to freeze the ice cubes, and "Silverice" is ready for use. "Silverice" do not stick together, and one or two may be easily extracted with the special tongs provided without disturbing the remainder in the tray. They do not affect the flavour of drinks or foodstuffs in any way, and after use they can be washed, dried, and rubbed up in the ordinary way and put back in the refrigerator to freeze again—which procedure can be carried out an infinite number of times. Moreover, the attractive appearance of "Silverice" graces the finest table.

Gas undertakings should be interested in this additional selling point for Electrolux refrigerators, the prices for various quantities of which can be obtained on application to the makers.

Stanley and District Gas Company Applies to Become a Statutory Concern

Board of Trade Enquiry

On Friday, June 25, at the offices of the Board of Trade in London, Mr. J. F. Ronca (Director of Gas Administration) held an Enquiry into an application by the Stanley and District Gas Company for a Special Order under the Gas Undertakings Acts, 1920 to 1924, for the purpose of being converted into a statutory company.

There was opposition by the Durham County Council and the Stanley Urban District Council. The former was settled in the opening minutes of the Enquiry. The Stanley Urban District Council opposition, however, was on a number of matters affecting the general principle of the proposed Special Order and they were represented by Mr. H. Royston Askew. The Stanley Gas Company was represented by the Secretary, Mr. T. P. Ridley. The Stanley Company is owned by the Newcastle-upon-Tyne and Gateshead Gas Company, of which Mr. Ridley is Commercial Manager and Secretary.

Mr. RIDLEY, putting the case for the Company, said the Stanley and District Gas Company was incorporated in August, 1933, having purchased the gas undertaking in Stanley from private owners for the sum of £62,500, the purchase price including sixty freehold houses, a few of which were occupied by employees of the Company. The remainder were let and the profits from the letting went into the revenue of the Gas Undertaking. Prior to the transfer of the Undertaking to the Stanley Company the sale of gas was about 100 million cu.ft. per annum and at the present time it was slightly over 104 million cu.ft. per annum, and sales showed an increase of about 2½%. The storage capacity was equivalent to 60 hours of the present maximum demand. When the Undertaking was taken over in 1933, the calorific value was 400 B.Th.U., but it was now 425 B.Th.U. At the time of purchase the price of gas was 4s. 6d. per 1,000 cu.ft. with a certain scale of discounts, but at the present time, although the price was the same, the scale of discounts had been increased in favour of the consumers and thus the Stanley Company in the short time it had been in existence improved the quality of gas and reduced the price.

The area of the Company consisted of an inner and outer area and the charge in the outer area was 3d. per 1,000 cu.ft. extra as compared with the inner area, to ordinary consumers only. Gas fires and washing boilers were supplied on hire, hire-purchase, and for cash, but such apparatus was supplied free of rent to prepayment consumers, in which case the quantity of gas was reduced by 1 cu.ft. per 1d. The number of ordinary consumers was 418 and the number of prepayment consumers was 5,935, while the respective average annual consumptions were 29,112 cu.ft. and 5,582 cu.ft., the consumption in the case of prepayment consumers thus being very low. Before the purchase of the undertaking by the Stanley Company the number of cookers in use in the area was 1,063, which had since been increased to 2,962; washboilers had increased from 295 to 1,172, and fires from 284 to 792. Since the formation of the Company a regular dividend of 6% had been paid, and the capital issued was £62,500 in ordinary shares. There were reserves amounting to about £3,000 and a carry-forward last year of £613.

The Objections.

Coming to the objections to the Order by the Stanley Urban District Council, Mr. Ridley commented on the statement that the Council objected to the Order as a whole and reminded the Director that the Company was making this application on the direction of the Board of Trade.

Mr. ROYSTON ASKEW said the attitude of the Council was that they objected to the granting of the Special Order unless it was amended, in a manner he was going to suggest, to safeguard the consumers.

Continuing, Mr. RIDLEY said one of the objections was to the amount of the purchase price paid by the Stanley Company for the private undertaking—viz., £62,500—and the Council asked that there should be an enquiry as to how that sum was arrived at. He objected to any such action, said Mr. Ridley, because, in the first place, the purchase price was arrived at on the basis of the profits that were being made by the original vendors; moreover, the purchase took place before the Gas Undertakings Act of 1934, and therefore he submitted that the Board of Trade had no powers to enter into any such enquiry. The whole of the facts were gone into, and the Company considered that the price paid was a fair one. That that was so was seen in the fact that the Company was still paying 6%. As a matter of fact, the Stanley Company was owned by the Newcastle Company, and the Directors of that Company were not likely to have paid an unduly high price having regard to the reputation of that Company for efficiency of operation. As a matter of fact, the Directors of the Newcastle Company now had under consideration a Special Order for the acquisition of the South Shields Gas Company.

Mr. ROYSTON ASKEW: Which is not unopposed.

Mr. RIDLEY said that another objection by the Council was that under Section 161 of the Public Health Act there were powers to a local authority, where there was not a statutory supply of gas, to apply for powers to supply gas itself and that if this Special Order were granted, that power would be taken away from the local authority. The position was that the Gas Undertaking in Stanley had been in existence for very many years, and no effort had ever been made by the Stanley Council to apply for gas powers—and again he reminded the Director that the present application of the Stanley Company was under the direction of the Board of Trade itself. Moreover, a portion of the Stanley Urban District was supplied by the Annfield Plain Company so that in any event the Stanley Council would not be able to apply for gas powers over the whole of its area. The Stanley Council also asked for a clause to be inserted giving power to the Council to purchase the Undertaking, but again Mr. Ridley said that such a clause would not be justified where, as in this case, the Gas Company were making an application for statutory powers under compulsion. Such a clause, moreover, would hamper and restrict the Company in the development of the Undertaking and it would also hamper any negotiations with a Holding Company, although no such negotiations were in contemplation at the moment. If, however, the Stanley Urban District Council really desired to purchase the Undertaking, he was authorized to say that the Directors would give any such proposal careful and sympathetic consideration. They objected, however, to a clause giving the Council the right to purchase the Undertaking when it thought fit.

Continuing, Mr. Ridley said there was also an objection to the basic price principle being adopted in this case.

Mr. ASKEW intervened that after what had taken place in other quarters, this objection was not now persisted in.

Basic Dividend.

Mr. RIDLEY then drew attention to an objection to the basic dividend proposed of 6% and said that if this were reduced, then the basic price of 12·6d. per therm proposed in the Order would have to be considerably increased because since the drafting of the Order and its deposit with the Board of Trade the price of coal had gone up by 4s. or 5s. per ton and, further, the Gas Industry at the moment was faced with an application by the workers for increased wages. As a matter of fact, he did not know how these matters were going to affect the Company because they had arisen since the Order was drafted.

Mr. ROYSTON ASKEW, addressing the Director, said the

amount of capital to be authorized in the case of a company like this was of great importance to the consumers because the amount of capital was, so to speak, the turning point of the basic price system. In the present case the capital cost amounted to no less a sum than £1,500 per million, and in addition to the £62,500 for the purchase price, the capital powers included a further £7,500 additional capital. The Council therefore asked that an enquiry should be made as to the precise amount of the purchase price which related to the assets of the Gas Undertaking, because it was obvious that the whole of the £62,500 did not.

Mr. RIDLEY said that enquiries had been made as to what proportion related to the sixty freehold houses, and as far as the available figures were concerned it seemed that they represented £6,700. Even if there were an enquiry, it would not be possible to obtain any further details because of the manner in which the accounts of the vendors were kept, relating as they did to other assets than the Gas Undertaking. He reiterated, however, that in his view this was not a matter for enquiry inasmuch as the purchase took place before 1934, the date of the Act under which the Company was now being compelled to apply for statutory powers. He agreed that probably not more than half-a-dozen of the houses were occupied by the staff of the Gas Company, but all the remainder were let and the rents went into the revenue of the Gas Undertaking and showed a profit of 6%.

Mr. ASKEW said this might not be the case if there happened to be another trade depression and the bulk of the property was empty. Continuing, he submitted to the Director that information should be available as to the amount that was paid for goodwill. He also commented on the fact that the proposed basic price was the present selling price and this was too favourable to the Company from the point of view of paying dividends.

Mr. RIDLEY reminded the Director that the whole tendency at the present moment was for costs to go up and in some respects they would undoubtedly permanently be higher.

Mr. ASKEW said that in the majority of cases a basic dividend of 5% was adopted, and he saw no reason why that should not be adopted in this case also. Commenting again on the amount of the purchase price, Mr. Askew said that the figure of £62,500 meant that a very large sum would be paid each year into the special purposes fund and the renewals fund, taking the usual proportions of 1% and ½%—the actual amount in the case of this small Company being £937, which represented 5d. per 1,000 cu.ft.

In the course of further remarks, Mr. Askew said that apparently no attempt had been made by the Company to ascertain whether the differential of 3d. per 1,000 cu.ft. charged in the outer area was an economic figure. He asked the Director to make enquiries as to the details of the purchase price and to deduct from the capital in respect of that at least the amount representing the freehold houses—of which it had been admitted only a few were occupied by the workpeople of the Gas Company—and with consideration to the amount paid for goodwill, if this could be ascertained. He submitted that the Board of Trade would only be justified in authorizing the capital asked for in the Order in so far as the proportion of it which was attributable to the gas undertaking. In the circumstances he submitted it was the duty of the applicants to reconsider the whole position and put before the Board of Trade evidence as to the exact details of the purchase price of £62,500.

Coming to the basic price of 12·6d. per therm, Mr. Askew contended that this figure was too high, having regard to the circumstances of the purchase, and in the same way the basic dividend proposed of 6% was too high. In connection with differential of 3d. per 1,000 cu.ft. in the outer area, Mr. Askew said the differential should never be more than the extra cost of giving the supply in the outer areas and the Board of Trade, in the present case, should have some evidence justifying this 3d.

Commenting on the question of the right of a local authority to set up a gas undertaking under the Public Health Act, Mr. Askew asked that a clause should be inserted giving the Local Authority the right of applying for powers to purchase the undertaking of the Stanley Company, with the condition that the Company should not oppose any such application.

At the conclusion of the Enquiry it was agreed that should the Board of Trade obtain further information with regard to the purchase price, this should be submitted to the Stanley Urban District Council for its comments, the Director pointing out, however, that the usual practice of the Board was not to go into details in this way once the public Enquiry was closed.

(Continued from p. 998.)

mentary contribution to the discussion. His remark that those of us who have been fortunate enough to modernize our equipment during the lean years have cause to be thankful will find a strong echo in Melbourne, and his interesting statement that at Beckton 35 years ago there were 6,000 men employed on the maximum load whereas to-day the number is less than half and the capacity of the works double, is in line with the experience in Melbourne, although probably a greater achievement in the circumstances.

The value of the C.W.G. plant may be as great in the future as in the past, especially in the direction of maintaining economic prices for coke and (as in Australia) thereby benefiting neighbouring Undertakings not equipped with water gas plant.

Mr. Hunter says that the increasing demand for graded coke may continue so long as the British public retains its affection for open fires.

The figures quoted in the Presidential Address would indicate that the preference of the British public is still for the open coal fire, over two-thirds of the heat supplied for domestic use being in the form of raw coal.

With reference to trouble developing through the evolution of sulphuretted hydrogen from gasholder water, the impurity has not been communicated to the gas to such an extent as to cause trouble with test Papers although recently the situation has occasioned us great concern.

Mr. Carmichael is of the opinion that the general reason for the consolidation described involving complete gasification—viz., the decline allowed to occur in the value of coke—is entirely negatived by experience in Great Britain. He stated that he used the word allowed "designedly." The correct expression would have been "ignorantly." During the past ten years in Melbourne the screening and grading of coke has been improved immensely and its price is higher in relation to that of coal than at any previous period. Mr. Carmichael is gas-minded and coke-minded; gas comes first and coke second and according to him that will be the case for many years to come. It does not appear that every statement Mr. Carmichael makes is necessarily correct.

The suggestion that lost coke consumption arising from the conversion of cable trams to electric propulsion might be retained by the extra breeze resulting from the cutting and grading of coke is impossible for one reason and undesirable in any case. The electric power for the trams is generated by the State Electricity Commission and the City Council from State-owned brown and black coal and to cut coke to obtain breeze is not a business proposition in Melbourne. Mr. Carmichael complains of the absence of the composition and calorific value of briquettes. This information is given on p. 18 of the Paper.

Mr. Carmichael makes the surprising assertion that the line of least resistance has been followed in connection with the failure of silica refractories—*i.e.*, to reduce temperatures. The fact is that owing to the condition of the settings after two major repairs it has not been possible to maintain higher temperatures.

In connection with the complete gasification experiments the costs given are fuel costs only in the pilot plant, and not those deduced for a larger sized plant.

The expected life of steel plate oxide containers would be at least 25 years.

Therm charging has been considered but in my opinion this is a matter for combined action through the National Gas Association of Australia.

In reply to Mr. Sharman it is probable that in practice oxide would have to be removed from the steel containers for revivification purposes.

I desire to express my appreciation of the friendly nature of the reception of somewhat unorthodox views, to admit that the advocates of coke have made out an excellent case for the improvement of that commodity, and to reiterate my view that a safe policy would be to take up further increases in the demand for gas by the installation of plant designed to produce gas only.

The Petroleum Industry

International Congress in Paris

The Second International Congress in Paris was attended by about 1,500 delegates, and over 400 Papers were submitted. The attention now being devoted to the subject of cracking was brought out by several of the Papers, and there was considerable discussion on the distribution of butane.

Lord Cadman of Silverdale (formerly Sir John Cadman) was the chief British delegate. The other delegates were Mr. F. C. Starling; Dr. F. S. Sinnatt, C.B., M.B.E.; Dr. A. E. Dunstan; Mr. J. Kewley; Mr. G. W. Lepper; and Mr. S. J. Astbury.

The proceedings were grouped under five headings which dealt with (1) geology; (2) physics, chemistry, and cracking; (3) materials and methods of construction; (4) utilization; (5) economics and statistics. Considerable interest was displayed in the section held on June 15, when the production of motor spirits by synthetic means was being discussed. Methods of cracking oil, utilization, and purification of petrol and of the gases from the wells were also dealt with in one section.

Whessoe Foundry and Engineering Company, Ltd.

Sound Position

The Seventeenth Annual Meeting of the Whessoe Foundry and Engineering Company, Ltd., was held on June 25 at 25, Victoria Street, S.W. 1, Mr. HAROLD G. JUDD, C.B.E., C.A. (the Chairman), presiding.

The CHAIRMAN said: Your Directors are glad to be able to submit accounts which reflect such a satisfactory outcome of a year which has been characterized by considerable industrial activity. I think we may fairly claim that this result is due not only to the rising tide of prosperity in the industry but also to the efficiency of the works and the skill and foresight of the management.

The volume of orders received was the largest for many years, and I am glad to say that the order-book to-day is even better. Despite foreign competition it includes a considerable amount of work abroad and covers an ever-widening range of products. By its size and organization the Company is well adapted for its class of work, being able to carry an expert staff sufficiently large to undertake contracts of considerable magnitude, but at the same time is small enough to retain the intimate touch between all departments which is so necessary for efficiency and good service.

The principal product of the Company continues to be the manufacture and erection of large storage tanks for oil, water, tar, and other fluids. During the year orders were received for over 400 tanks, representing a storage capacity of well over one million tons.

Considerable attention is being given to the prevention of evaporation of volatile liquids, especially light oils such as petrol; and improved designs for the suitable storage of such liquids have been evolved both independently and in conjunction with the Chicago Bridge and Iron Company.

An expert technical staff enables us to carry out contracts for the gas, iron, and chemical industries, embodying not only the construction but also the design and guaranteeing of process plants of all types. Innovations and improvements are constantly being made in the Company's range of designs for the cleaning of blast-furnace gas, coke oven gas, and producer gas, and we have secured a considerable volume of orders of this type. Spherical and cylindrical tanks for storing town gas under pressure are one of our specialities, and you may have seen reference in the Press to the spherical gasholder built by us on Canvey Island for the Gas Light and Coke Company.

Much progress has been made in electric arc welding design and technique, and as a result a large and increasing quantity of welded work is being carried out. A well-arranged plant for the phosphoric acid pickling and painting of steel plates and sections was completed during the year, and is in full operation, treating some 400 tons per week. The process is perhaps one of the greatest contributions made in recent years towards the prevention of corrosion of industrial steelwork. Erection contracts at home and abroad are carried out by an experienced staff, and at the present time erection is in hand at 21 sites.

You will see therefore that the progressive policy of the Company has put us in a position to secure the utmost advantage in this time of expansion; it should also minimize the effect of any future depression in any one section of the industry. In carrying out this policy I am glad to say we have the full co-operation of the staff, who have not only worked strenuously and well, but have shown a commendable degree of initiative and enterprise. I must refer particularly to the very important part which Mr. Spielman has played and I know he would wish me to associate with his name the members of his staff, to all of whom I should like to tender our cordial thanks.

In the interests of shareholders who may desire a freer market for the disposal or acquisition of the Company's shares, your Directors have approached the Committee of the London Stock Exchange, who have granted permission for recording dealings in the shares in the daily supplementary or unofficial list. In that connection it may be appropriate to remind you that the Company was formed in 1920, and that including the dividend now recommended, during the 17 years since then, it has paid dividends totalling 206%, which represents an average of 12% per annum, less tax. For the last five years the average is 8½%.

During those years the works have been re-modelled on modern lines and considerably extended, and valuable plant has been added for new classes of work. Notwithstanding this the works and plant stand in our balance-sheet to-day at practically the same figure as 15 years ago.

The accounts I think speak for themselves, and I need only point out that the strength of our financial position is shown by the fact that our current assets amount to £265,166, while our liabilities, including provision for taxation, are only £88,806. It is a pleasure to state that the net profits of the year after making full provision for depreciation and contingencies amount to £72,803. After deducting provision for taxation of £25,603, we are left with £47,200, as shown in the accounts. Adding to this amount the sum brought forward from the previous year, we have a surplus of £52,084 to deal with. We have set aside £10,000 to general reserve, bringing that reserve up to £50,000, and propose a dividend which will absorb £30,000, thus leaving (subject to the Directors' commission on profits payable in accordance with the articles of association) an amount of £12,084 to be carried forward.

I now conclude by moving the adoption of the Directors' report and the accounts and the declaration of the dividend recommended therein—namely, 20%, less income-tax.

The resolution was seconded and was carried unanimously.

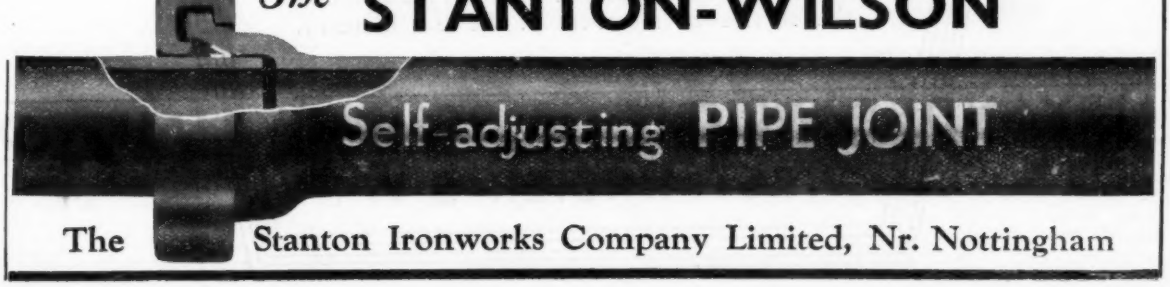
Traffic Vibration
Rigid or Self-adjusting Joints?

Not many of the problems brought into being by the remarkable growth of road transport during the last decade are capable of easy solution.

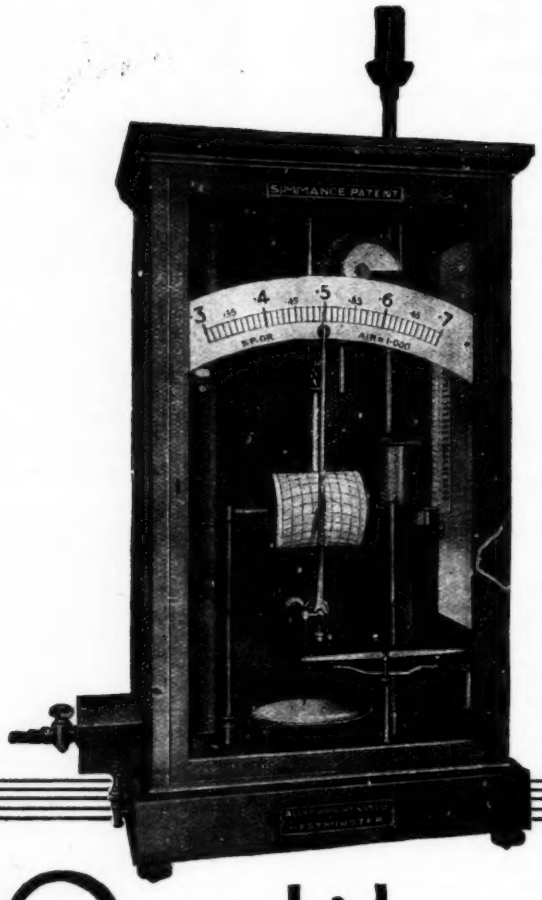
There is at least one exception, however. For instance, though much has been heard of the danger caused to historic buildings by traffic vibration, the harmful effects of such vibration on water and gas mains are not so apparent. To water and gas engineers responsible, however, for the maintenance of these essential public services, this was a very real problem until a few years ago, for rigidly-jointed mains could not be expected to withstand the severe vibration caused by modern conditions.

Some six years ago the Stanton Company introduced the Stanton-Wilson Self-adjusting pipe-joint to overcome this and similar difficulties. That it has successfully done so is proved by the fact that more than 1,500 miles of Stanton-Wilson mains have now been laid by over 750 public authorities.

The STANTON-WILSON



The Stanton Ironworks Company Limited, Nr. Nottingham



Gas Quality dominates Gas Supply

. . . . that, in our view, epitomises the import of the Papers and Discussions at the recent Institution Meeting.

Much of the information employed was based on data obtained from the Simmance Patent GRAVITOMETERS used at the Undertakings of the Members taking part, and from instruments made by this firm for the measurement of calorific value, carbon-dioxide, carbon-monoxide, A.T.B. number, and other factors affecting the efficiency of gas production and supply.

Our experience in gas-testing and the manufacture of precision apparatus and recorders is always at the service of members of the Gas Industry.

ALEXANDER WRIGHT and COMPANY LIMITED

WESTMINSTER · S · W · 1

Gas Markets and Manufactur

Stock Market Report

(For Stock and Share Lists, see later pages)

Somewhat contrary to expectations, markets opened the New Account last week under dull conditions with the volume of business in most sections almost down to a minimum. Later on, however, a more confident tone prevailed, buyers were more in evidence, and the activity became greater than for some time past. Home and foreign rails showed improvements, and the oil and rubber markets were firm. Gold-mining shares received a stimulus on the announcement of the increase in the Exchange Equalization Fund, while more interest was displayed in industrials, especially among iron and steel shares. The only weak spot was the gilt-edged section, which was adversely affected by the failure of the L.C.C. issue of £200,000,000 3½% stock at 100½, nearly 90% being left in the hands of the underwriters.

The Gas Market had a fairly busy week and, with few exceptions, values remained unchanged. The terms of the offer by the South-Eastern Gas Corporation to the stockholders of the North Middlesex Gas Company (particulars of which appeared in last week's "JOURNAL") led to a rise of 10½ points in the North Middlesex stock to 165. Another sharp increase was that of Uxbridge ordinary, which gained 8 points to 152½. Apart from the usual half-yearly *ex* interest reductions, the only fall of note was a further drop of 3 in Imperial Continental to 150½. Quotations at the Provincial Exchanges and in the Unofficial List again closed without change.

At the time of writing there is quite a heavy list of gas stocks and shares of the fixed interest variety on offer giving a yield of 4%. Among these are the following: Oxford 4½% preference at 112½, and Lea Bridge, Mid-Southern, and Wandsworth 4% preference stocks, all at par, while a parcel of £5,000 Hampton Court new 4% preference is available at 101—the latter pays 3 months' dividend on Sept. 1. Among debenture stocks, a parcel of £14,000 Newcastle 3½% is on offer at 93 *ex* div. giving a return of £3 15s. 3d.%, and a small lot each of Bristol 5% at 120, Dover 4% at par, and Slough 5% at 117½ are also in the list. A parcel of £15,000 Plymouth and Stonehouse ordinary (dividend 8%) is offered at 170¼ to yield £4 14s.%.

Current Sales of Gas Products

The London Market for Tar Products.

June 28.

There is little change to record in the London tar products market, current values being as follows:

Pitch, 37s. 6d. to 38s. per ton f.o.b.
Creosote, 6d. to 6½d.
Refined tar, 3¾d.
Pure toluole, 2s. 6d.; pure benzole, 1s. 9d.; 95/160 solvent naphtha, about 1s. 8d.; and 90/160 pyridine, about 8s.; all per gallon naked at makers' works.

Tar Products in the Provinces.

June 28.

The average prices of gas-works products during the week were: Gas-works tar, 22s. 6d. to 27s. 6d. Pitch—East Coast, 35s. to 36s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 35s. to 36s.* Toluole, naked, North, 2s. to 2s. 1d. Coal tar crude naphtha, in bulk, North, 8½d. to 9d. Solvent naphtha, naked, North, 1s. 6½d. to 1s. 6½d. Heavy naphtha, North, 1s. 3d. to 1s. 3½d. Creosote, *ex* works, in bulk, North, liquid and salty, 5d. to 5½d.; low gravity, 4⅝d. to 4¾d. Heavy oils, in bulk, North, 5d. to 5¼d. Carbolic acid 60's, 3s. 7½d. to 3s. 10½d. Naphthalene, £18 to £20. Salts, 90s. to 95s., bags included. Anthracene "A" quality, 4¼d. to 4⅝d. per minimum 40% purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *June* 26.

New business is not too plentiful but, on the whole, prices are well maintained.

Crude gas-works tar.—The actual value is 37s. to 38s. per ton *ex* works in bulk.

Pitch remains rather uninteresting with prices called 30s. to 32s. 6d. per ton f.o.b. Glasgow for export, and 30s. per ton *ex* works in bulk for home trade.

Refined tar.—A fairly substantial throughput is being maintained with prices at round 3d. to 3¼d. per gallon free on rails for export, and 3½d. to 3⅝d. per gallon *ex* works in buyers' packages for home trade.

Creosote oil.—Available supplies are well looked after and prices are steady as under: Specification oil, 5½d. to 5⅝d. per gallon; low gravity, 6d. to 6¼d. per gallon; neutral oil, 5¼d. to 5½d. per gallon; all *ex* works in bulk.

Cresylic acid.—New business is not so plentiful but, makers being so well sold on contract, prices are well held as under: Pale, 97/99%, 4s. 5d. to 4s. 7d. per gallon; dark, 97/99%, 4s. 2d. to 4s. 4d. per gallon; and pale, 99/100%, 4s. 10d. to 5s. 1d. per gallon; all *ex* works in buyers' packages.

Crude naphtha.—Available supplies command 6d. to 6¼d. per gallon *ex* works in bulk, according to quality and district.

Solvent naphtha.—90/160 grade is 1s. 4½d. to 1s. 5½d. per gallon, and 90/190 heavy naphtha is 11d. to 1s. per gallon.

Motor benzole is unchanged at 1s. 4½d. to 1s. 5d. per gallon.

Pyridine.—Prices are nominal at 7s. to 8s. per gallon for 90/160 grade, and 8s. to 9s. per gallon for 90/140 grade.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s. d.		s. d.	
Crude benzole . . .	0 10	to	0 10½	per gallon at works
Motor ,, . . .	1 3½	,,	1 4	,, ,, ,,
90% ,, . . .	1 4½	,,	1 5	,, ,, ,,
Pure ,, . . .	1 8½	,,	1 9	,, ,, ,,

Contracts Advertised To-Day

Air Compression Tank.
Sutton-in-Ashfield Waterworks Department. [p. 1022.]

Coal.
Chorley Gas Department. [p. 1022.]
Fleetwood Gas Company. [p. 1022.]
Haverhill U.D.C. Gas Department. [p. 1022.]
Marple U.D.C. Gas Department. [p. 1021.]

Electric Motors.
Sutton-in-Ashfield Waterworks Department. [p. 1022.]

Electrical Control Gear.
Sutton-in-Ashfield Waterworks Department. [p. 1022.]

Gasholder Materials.
Wallasey Gas Department. [p. 1021.]

Pipes and Connections.
Sutton-in-Ashfield Waterworks Department. [p. 1022.]

Turbine Booster Pumps.
Sutton-in-Ashfield Waterworks Department. [p. 1022.]

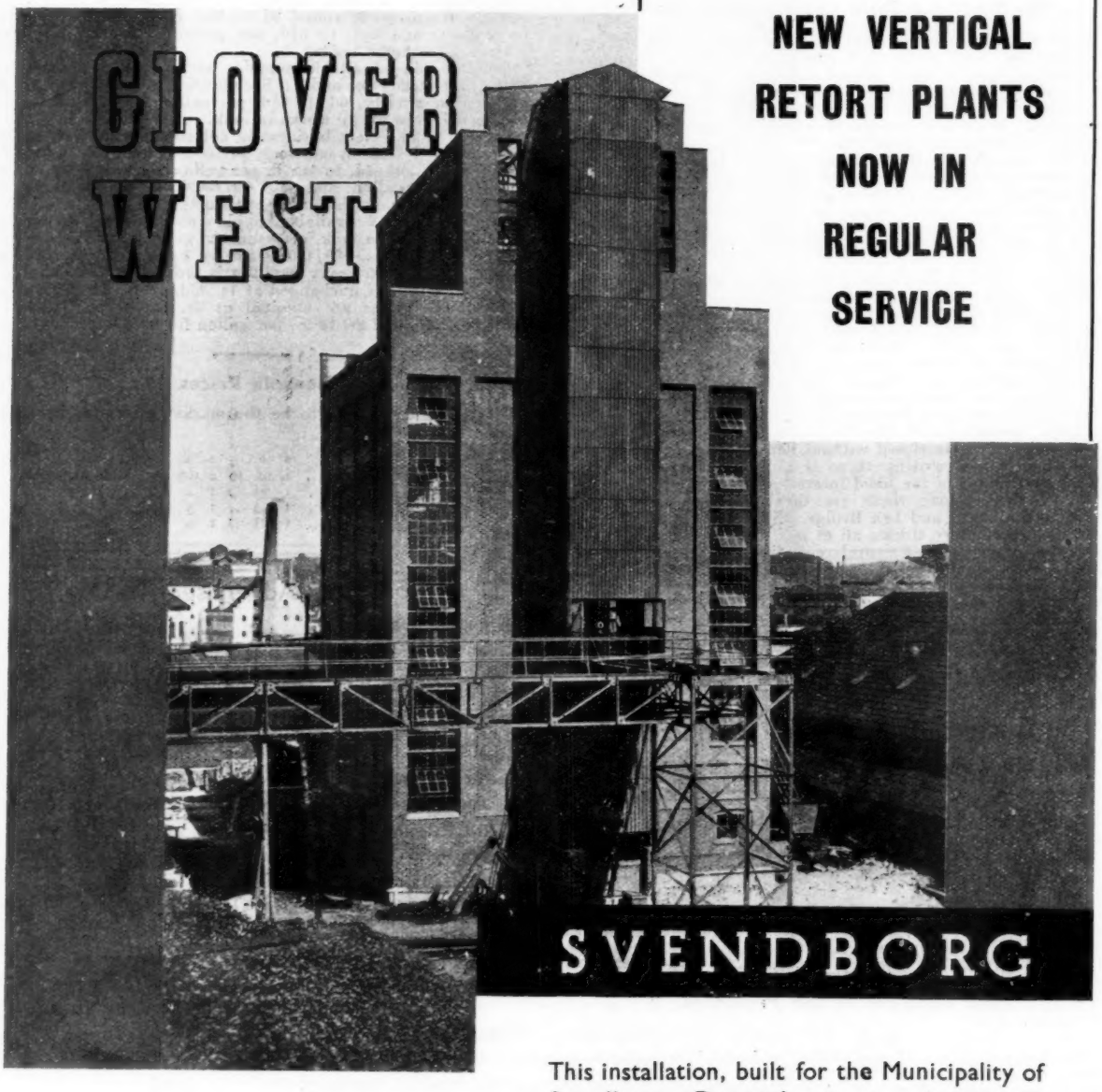
Vertical Retorts.
Keighley Gas Department. [p. 1022.]

Water Pumping Machinery.
Wallasey Gas Department. [p. 1021.]

Further Gas Undertakings' Results

Skipton.

The annual report of the Skipton Gas Department for the year ended March 31, 1937, states the total quantity of gas delivered has been 126,200,000 cu.ft., and the total quantity sold 114,253,900 cu.ft., an increase of 534,200 cu.ft., or 0·47% on the previous year. The total revenue from gas sold was £21,216 6s. 9d., which represents an average price of 3s. 8·57d. per 1,000 cu.ft. There are now 1,577 ordinary and 3,348 prepayment consumers, an increase of 51 on the previous year. During the year three new consumers have been obtained on the commercial scale and eight on the central heating rate. The average consumption for ordinary consumers was 32,340 cu.ft. and for prepayment consumers 17,220 cu.ft. The expenditure on revenue account has been £25,663, while the income has been £32,229, giving a gross profit of £6,566. Capital charges, income-tax, and interest amount to £6,128. An additional credit of £984 has been transferred from the working balance account, resulting in a net profit of £1,427.



400 plants in 24 countries

This installation, built for the Municipality of Svendborg, Denmark, is an interesting example of the modern Glover-West vertical retort plant designed for the smaller works. It is an eight-retort unit with fuel-gas producers equipped for breeze-burning, waste-heat recovery plant and electric lift. Coaling is by means of an automatic skip-hoist.

WEST'S GAS IMPROVEMENT CO., LTD.

MANCHESTER: ALBION IRONWORKS, MILES PLATTING ■ **LONDON:** COLUMBIA HOUSE, ALDWYCH, W.C. 2

STOCK AND SHARE LIST

Official Quotations on the London Stock Exchange

Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations June 25.	Rise or Fall on Week.	Transactions, Lowest and Highest Prices During the Week.
1,767,439	Stk.	Mar. 15	8	8	Alliance & Dublin Ord. ...	170—175	...	171⅝
374,000	,,	June 21	4	4	Do. 4 p.c. Deb. ...	95—100*	−1	...
558,890	,,	Feb. 15	7	7	Barnet Ord. 7 p.c.	160—165	...	160—163
300,000	1	Apl. 5	1/4⅛	1/9⅛	Bombay, Ltd.	25/6—27/6	...	...
179,915	Stk.	Mar. 1	9½	9½	Bournemouth sliding scale ...	195—205	...	...
590,407	,,	,,	7	7	Do. 7 p.c. max. ...	161—166	...	162
493,960	,,	,,	6	6	Do. 6 p.c. Pref. ...	133—138	...	...
50,000	,,	June 21	3	3	Do. 3 p.c. Deb. ...	79—84*	−1	...
262,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	98—103*	−2	...
335,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	116—121*	−2	...
357,900	,,	Feb. 15	7½	7½	Brighton, &c., 6 p.c. Con. ...	155—160	...	...
649,955	,,	,,	6¾	6¾	Do. 5 p.c. Con. ...	138—143	...	141
205,500	,,	,,	6	6	Do. 6 p.c. 'B' Pref. ...	130—135	...	131—134
855,000	,,	Mar. 1	7	8	British Ord.	148—153	...	151
100,000	,,	June 21	7	7	Do. 7 p.c. Pref.	140—145*	−3	...
350,000	,,	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	108—113*	−2	...
120,000	,,	June 7	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	102—107	...	...
450,000	,,	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...	...
100,000	10	22 May '33	6	4	Cape Town, Ltd.	1—3	...	...
100,000	10	6 Nov. '33	4½	4½	Do. 4½ p.c. Pref. ...	1⅛—3½	...	...
150,000	Stk.	June 21	4½	4½	Do. 4½ p.c. Deb. ...	78—83*	−2	82½
626,860	,,	Feb. 1	6	6	Cardiff Con. Ord.	120—125	...	...
237,860	,,	June 7	5	5	Do. 5 p.c. Red. Deb.	107—112	...	...
98,936	1	Apl. 5	2/-	2/-	Colombo Ord.	1⅜—1⅞	...	...
24,510	1	,,	1/4½	1/4½	Do. 7 p.c. Pref.	23/—25/-	...	...
739,453	1	Mar. 15	-/11·48	-/11·48	Colonial Gas Assn. Ltd. Ord.	17/—19/-	...	...
296,144	1	,,	1/3·30	1/3·30	Do. 8 p.c. Pref.	22/—24/-	...	...
1,775,005	Stk.	Feb. 1	5	5	Commercial Ord.	88—93	...	92
620,000	,,	June 7	3	3	Do. 3 p.c. Deb. ...	74—79	...	...
286,344	,,	Feb. 15	5	5	Do. 5 p.c. Deb. ...	115—120	...	116½
807,560	,,	Feb. 15	7	7	Croydon sliding scale ...	143—148	...	146
644,590	,,	,,	5	5	Do. max. div.	109—114	...	110—111
620,385	,,	June 21	5	5	Do. 5 p.c. Deb.... ...	113—118*	−2	...
239,000	,,	Feb. 1	5	5	East Hull Ord. 5 p.c.... ...	100—105	...	...
185,355	,,	Feb. 15	6	6	East Surrey Ord. 5 p.c. ...	122—127	...	...
176,211	,,	June 7	5	5	Do. 5 p.c. Deb. ...	113—118	...	117
250,000	1	Nov. 15	6	4	Gas Consolidation Ord. ...	20/—22/-	...	...
250,000	1	May 24	4	4	Do. 4 p.c. Red Cum. Pref.	19/—21/-	...	...
19,255,284	Stk.	Feb. 1	5⅔	5⅔	Gas Light & Coke 4 p.c. Ord.	25/—26/-a	...	25/—25/4½
2,600,000	,,	,,	3⅔	3⅔	Do. 3⅔ p.c. max.	81—84	...	83—83½
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	100—103	...	101½—102
2,993,000	,,	...	...	...	Do. 3⅔ p.c. Red. Pref.	100—103	...	101⅔—102½
8,602,497	,,	May 24	3	3	Do. 3 p.c. Con. Deb. ...	80—83	...	81½—83½
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	110—113	...	...
3,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb....	109—112	...	111—111⅞
700,000	,,	Mar. 1	25/5§	3½	Do. 3½ p.c. Red. Deb....	96—101	−1	97½—100½
270,466	,,	Feb. 15	6	6	Harrogate New Cons. ...	122—127	...	...
213,200	,,	Feb. 15	6	6	Hornsey Con. 3½ p.c. ...	120—125	...	...
5,600,000	,,	May 24	8	12	Imperial Continental Cap. ...	148—153	−3	148—152
223,130	,,	Feb. 1	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...	...
285,242	,,	Mar. 1	8½	8½	Lea Bridge 5 p.c. Ord. ...	160—165	...	...
11,751	,,	Mar. 1	8	10	Maidstone Gas 5 p.c. Cap. Stk.	180—190	...	...
63,480	,,	June 21	3	3	Do. 3 p.c.Prp.Db.Stk.	71—76*	−1	...
75,000	,,	May 24	†10	†10	Malta & Mediterranean ...	150—160	...	...
392,000	—	Apl. 1	5⅔	5⅔	Metropolitan (of Melbourne) 5⅔ p.c. Red. Deb. ...	98—103	...	103
231,978	Stk.	Feb. 15	5	5	M.S. Utility 'C' Cons. ...	102—107	...	105
968,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	95—100	...	98½
360,075	,,	June 21	4	4	Do. 4 p.c. Deb. ...	97—102*	...	...
148,955	,,	,,	5	5	Do. 5 p.c. Deb. ...	115—120*	...	...
125,000	—	Jan. 4	3⅓	3⅓	Do. 3⅓ p.c. Rd.Rg.Bds.	97—100	...	...
675,000	Stk.	May 3	†6	†9	Montevideo, Ltd.	85—90	...	89—90
250, 00	,,	Feb. 15	7⅓	7⅓	North Middlesex 6 p.c. Con.	160—170	+10½	...
396,160	,,	Feb. 1	5	5	Northampton 5 p.c. max. ...	102—107	...	...
300,000	,,	Apl. 19	†9	†7	Oriental, Ltd....	162—167	...	165½
468,537	,,	June 7	8	8	Plymouth & Stonehouse 5 p.c.	160—170	...	160
621,667	,,	Feb. 15	8½	8½	Portsmouth & Gosport Cons.	167—172	...	...
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	105—110	...	106½
73,350	,,	,,	...	5	Do. 5 p.c. Pref. ...	112—117	...	...
441,275	1	May 3	1/-	1/1⅞	Severn Val. Gas Cor. Ld. Ord.	21/—23/-	...	22/6
460,810	1	Mar. 15	-/10½	-/10½	,, ,, 4½ p.c. Cum. Pref.	20/—22/-	...	...
133,201	Stk.	Feb. 15	5	8⅓	Shrewsbury 5 p.c. Ord. ...	140—145	...	...
90,000	10	June 7	14	14	South African...	3¾—4¾	...	...
1,371,752	1	May 3	1/2½	1/2½	South East'n Gas. Cn.Ld. Ord.	24/—26/-	...	...
871,636	1	Mar. 1	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pref.	20/—22/-	...	21/4½—22/-
498,818	1	,,	4	4	Do. 4 p.c. Cum. Pref. ...	19/—21/-	...	19/9
450,000	,	Feb. 15	4	4	Do. 4 p.c. Deb.	100—102	...	...
150,000	Stk.	,,	3⅓	3⅓	Do. 3½ p.c. Red. Deb. ...	99—101	...	...
6,709,895	,,	Feb. 1	5	6	South Met. Ord.	107—110	...	108—109¾
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf. ...	132—137	...	...
850,000	,,	,,	4	4	Do. 4 p.c. Irred. Pf. ...	98—101	...	100½
1,895,445	,,	June 21	3	3	Do. 3 p.c. Deb. ...	75—80	−1	76½—76¾
1,000,000	,,	Jan. 4	5	5	Do. 5 p.c. Red. Deb....	107—112	...	110
1,543,795	,,	Feb. 1	6	6	South Suburban Ord. 5 p.c....	122—127	...	124—125
512,825	,,	,,	5	5	Do. 5 p.c. Pref....	112—117	...	...
500,000	,,	,,	4	4	Do. 4 p.c. Pref....	95—100	...	98
888,587	,,	June 7	5	5	Do. 5 p.c. Deb....	115—120	...	118—120
250,000	,,	,,	4	4	Do. 4 p.c. Deb....	97—102	...	...
200,000	,,	...	...	...	Do. 3½ p.c. Red. Deb.	94—98	...	...
427,859	1	May 3	9⅜	1/2⅜	S. Western Gas & Water Ord.	19/—21/-	...	19/3—20/-
160,523	1	Apl. 19	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pf.	20/—22/-	...	...
110,000	Stk.	June 21	4	4	Do. 4 p.c. Red. Deb. ...	97—102*	−1	...
750,541	,,	Feb. 1	5	5⅓	Southampton Ord. 5 p.c. ...	111—116	...	...
148,836	,,	June 7	4	4	Do. 4 p.c. Deb.	97—102	...	...
350,000	,,	Feb. 15	5⅓	5⅓	Swansea 5⅓ p.c. Red. Pref. ...	110—115	...	...
106,000	,,	June 7	6⅔	6⅔	Do. 6⅔ p.c. Red. Deb. ...	97—100	...	...
94,000	,,	,,	3⅓	3⅓	Do. 3⅓ p.c. Red. Deb. ...	95—100	...	...
1,076,490	,,	Feb. 15	6⅔	6⅔	Tottenham and District Ord.	137—142	...	141½—142
409,835	,,	,,	5⅓	5⅓	Do. 5⅓ p.c. Pref....	123—128	...	125
62,235	,,	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...	...
371,850	,,	June 7	4	4	Do. 4 p.c. Deb. ...	97—102	...	...
373,939	,,	Feb. 15	7	7	Uxbridge, &c., 5 p.c. ...	150—155	+8	154—155
133,010	,,	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...	...
1,371,138	,,	Feb. 1	7	7	Wandsworth Consolidated ...	143—148	...	...
1,620,615	,,	,,	5	5	Do. 5 p.c. Pref ...	113—118	...	114½
500,000	,,	,,	33/4	4	Do. 4 p.c. Pref. ...	97—100	...	99½
1,343,964	,,	June 7	5	5	Do. 5 p.c. Deb. ...	115—120	...	...
383,745	,,	,,	4	4	Do. 4 p.c. Deb. ...	97—102	...	...
558,342	,,	Feb. 1	7	7	Watford and St. Albans Ord.	142—147	...	146—147
200,000	,,	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...	...
200,000	,,	,,	5⅓	5⅓	Do. 5⅓ p.c. Pref. ...	123—128	...	...
200,000	,,	June 7	4	4	Do. 4 p.c. Red. Deb.	97—102	...	...
100,000	,,	,,	3⅓	3⅓	Do. 3⅓ p.c. Red.Deb.	95—100	...	...

a.—The quotation is per £1 of Stock. * Ex div. † Paid free of Income-tax. ‡ For year. § Actual.

Stock and Share List continued overleaf.

DOMESTIC UTILIZATION of GAS

SMITH & LeFEVRE

PART 1.—A new and completely revised edition. In five years since the First Edition many developments have taken place in the Industry; and these are given their full weight in a work which has already proved of the utmost value to thousands, and is officially recommended by Teachers and Lecturers at many centres.

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STOCK AND SHARE LIST—Cont.

Stocks Officially Quoted on Provincial Exchanges

Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations. June 25.	Rise or Fall on Week.	Transactions, Lowest and Highest During the Week.
BRISTOL EXCHANGE.								
347,756	Stk.	Feb. 1	5	6	Bath Cons.	121—123	...	...
1,667,250	,,	Feb. 15	5	5	Bristol, 5 p.c. max.	116—117	...	...
120,420	,,	June 7	4	4	Do. 1st 4 p.c. Deb. ...	100½—102½	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	100½—102½	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	120—123*	...	...
274,000	,,	Mar. 1	5	5	Newport (Mon.) 5 p.c.max. ...	103—108	...	...
13,200	12	Mar. 15	7	8	Pontyp'l Gas & W. 10 p.c. 'A'	13½—14½	...	...
13,600	10	,,	5	6	Do. 7 p.c. 'B'	12—12½	...	...
40,000	10	,,	5	6	Do. 7 p.c. 'C'	12—12½	...	...
140,778	Stk.	Feb. 1	5	5	Weston-super-Mare Cons. ...	112—113	...	...
64,338	,,	June 21	4	4	Do. 4 p.c. Deb.	96—98*	−2½	...
33,340	,,	,,	7½	7½	Do. 7½ p.c. Deb.	157—160*	-3	...
LIVERPOOL EXCHANGE.								
157,150	Stk.	Feb. 1	5	6½	Chester 5 p.c. Ord.	106—111	...	...
92,500	,,	June 21	4	4	Do. 4 p.c. Pref.	97—101*	−1	...
36,430	,,	,,	3	3½	Do. 3½ p.c. Deb.... ...	89—94*	−1	...
41,890	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	98—102*	−1	...
2,167,410	,,	Feb. 15	6	6	Liverpool 5 p.c. Ord. ...	125½—127½	...	...
245,500	,,	June 21	5	5	Do. 5 p.c. Red. Pref. ...	99—104*	−2	...
306,083	,,	Jan. 4	4	4	Do. 4 p.c. Deb. ...	103—105	...	...
106,280	,,	Feb. 1	10	10	Preston 'A' 10 p.c.	210—220	...	...
188,219	,,	,,	7	7	Do. 'B' 7 p.c.	150—160	...	...
NEWCASTLE EXCHANGE.								
122,577	Stk.	Feb. 1	8	8	Blyth 5 p.c. Ord.	166—168	...	...
732,000	,,	Feb. 15	5	5	Hartlepool G. & W. Cn. & New	124—126	...	...
2,061,315	,,	Feb. 1	5	5⅔	Newcastle & Gateshead Con.	25 3—25 9ø	...	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	100—101	...	...
776,706	,,	June 21	3½	3½	Do. 3½ p.c. Deb. ...	93—94	...	...
277,285	,	Nov. 2	5	5	Do. 5 p.c. Deb. '43...	108—109	...	...
332,351	,	Feb. 1	6	6	Sunderland 6 p.c. max. ...	139—141	...	...
NOTTINGHAM EXCHANGE.								
542,270	Stk.	Mar. 1	7	9	Derby Con.	155—165	...	...
55,000	,,	June 7	4	4	Do. 4 p.c. Deb.	100—105	...	...
84,750	,,	Feb. 17	5	12	Long Eaton 'A' Ord. ...	...	...	...
50,000	,,	,,	4	10	Do. 'B' Ord. ...	...	...	...
20,000	10	June 21	5	5	Do. 5 p.c. Pref. ...	10—12*	...	...
80,000	Stk.	,,	5	5	Do. 5 p.c. Deb. ...	105—110*	...	...
SHEFFIELD EXCHANGE.								
10,000	Stk.	Aug. 10	10	10	Great Grimsby 'A' Ord. ...	210—220	...	...
6,500	,,	,,	10	10	Do. 'B' Ord. ...	210—220	...	...
79,000	,,	,,	10	10	Do. 'C' Ord. ...	205—210	...	...
1,806,339	,,	Feb. 15	6	6½	Sheffield Cons.	144—146	...	...
95,000	,,	Jan. 4	4	4	Do. 4 p.c. Deb.	101—104	...	...

Supplementary List of Stocks and Shares not Officially Quoted

202,152	Stk.	Mar. 15	25/-b	25/-b	Ascot Ord.	102—107	...	...
128,182	,,	Jan. 4	5	5	Do. 5 p.c. Pref.	110—115	...	...
474,410	1	May 24	5	5	Assd. Gas and Water Ord. ...	19/6—21/6	...	21/-
500,000	1	,,	4½	4½	Do. 4½ p.c. Cum. Pref. ...	19/6—21/6	...	20/-
500,000	Stk.	Mar. 15	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...	97⅞
17,000	,,	Feb. 15	8	8	Bognor Orig. Ord. 'A' ...	160—170	...	...
62,210	,,	,,	8	8	Do. New Addl. 'A' ...	160—170	...	...
87,160	,,	,,	7	7	Do. New 7 p.c. max. ...	140—145	...	...
37,440	,,	Feb. 1	10	10	Cam. Univ. & Town 10 p.c.max.	195—205	...	...
125,970	,,	,,	7	7	Do. 7 p.c. max.	137—142	...	...
39,025	,,	,,	5	5	Do. 5 p.c. max.	98—103	...	...
65,000	,,	Mar. 1	7½	8½	Eastbourne 'A' 5 p.c. ...	160—165	...	...
198,000	,,	,,	6	7	Do. 'B' 3½ p.c.	130—140	...	...
112,312	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
130,000	,,	June 21	5	5	Do. 5 p.c. Deb.	115—120*	...	...
24,000	30	Feb. 1	8½	8½	Great Yarmouth 8½ p.c. max.	45—50	...	...
59,400	30	,,	7½	7½	Do. 7½ p.c. max.	40—45	...	...
51,160	Stk.	June 7	5½	5½	Do. 5½ p.c. Deb.	120—125	...	...
152,600	,,	Feb. 15	8	9	Guildford Cons.	190—200	...	...
54,055	,,	,,	5	5	Do. 5 p.c. Pref.	112—117	...	...
68,250	,,	June 7	5	5	Do. 5 p.c. Deb.	113—118	...	...
156,600	,,	Feb. 15	7¼	7¼	Hampton Court Cons. ...	155—160	...	...
107,960	10	Mar. 15	4	5½	Mid Kent Ord.	9—10	...	...
230,940	Stk.	Feb. 15	10	10	Oxford & District Ord. ...	200—210	...	...
47,112	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
50,000	,,	,,	6	6	Do. 6 p.c. Red. Pref. ...	112—117	...	...
126,193	,,	May 3	7½	7½	Peterborough Ord.	159—169	...	...
64,990	,,	Mar. 15	6½	7½	Redditch Ord.	127—137	...	...
166,850	,,	Feb. 15	8	8	Romford Ord.	157—167	...	...
60,000	,,	,,	4	4	Do. 4 p.c. Pref.	97—100	...	...
44,000	,,	Mar. 15	5	5	Do. 5 p.c. Deb.	115—120	...	...
10,950	,,	Mar. 1	8	8	Ryde Ord.	160—165	...	...
136,191	,,	Feb. 15	5	7	Scarborough Ord.	123—133	...	...
27,825	,,	Feb. 1	8	8	Shanklin & Ventnor Cons. ...	158—168	...	...
270,086	,,	Mar. 15	7	7	Slough Ord.	137—142	...	...
21,000	,,	June 21	5	5	Do. 5 p.c. Deb.... ...	112—117*	−1	116½
28,872	1	May 24	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	19/—21/-	...	...
28,866	1	Mar. 15	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	18/6—20/6	...	...
137,730	Stk.	Feb. 15	7	7	Southgate & Dist. 7 p.c. max.	140—145	...	...
62,500	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
117,228	,,	Feb. 15	6	5	Swindon Cons.	108—113	...	...
60,425	,,	June 7	5	5	Do. 5 p.c. Deb.	111—116	...	...
64,380	,,	June 7	5	5	Torquay and Paignton 5 p.c. Pf	113—118	...	...
750,000	1	Apl. 5	4	6	Utd. Kingdom Gas Cpn. Ord.	20/6—22/6	...	20/9—21/1½
936,338	1	May 3	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	20/—22/-	...	20/9—21/3
674,084	1	June 7	4½	4½	Do. 4½ p.c. 2nd Non-Cum. Pref.... ...	17/—19/-	...	17/—17,9
600,000	Stk.	Mar. 15	3½	3½	Do. 3½ p.c. Red. Deb. ...	96—99	...	97⅜
130,000	,,	Feb. 15	5	8	Wakefield Ord.	126—131	...	...
81,650	,,	,,	5	5	Do. 5 p.c. max.	103—108	...	...
82,000	,,	Feb. 1	6	6	Weymouth Ord.	103—108	...	...
98,384	,,	Feb. 1	6	6	Wolverhampton 6 p.c. Pref....	125—130	...	...
160,000	,,	June 21	5½	5½	Do. 5½ p.c. Rd. Db	108—113*	−2	...
370,000	,,	Feb. 15	4	6	York Cons.	105—110	...	...
90,000	,,	June 21	5	5	Do. 5 p.c. Red. Deb. ...	105—110*	...	...
133,640	,,	Mar. 1	6½	6½	Yorktown (Cam.) 5 p.c ons.	130—135	...	...
120,000	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
35,000	,,	June 7	5½	5½	Do. 5½ p.c. Deb.... ...	123—128	...	...

ø The quotation per £1 of Stock þ Annual for Quarter. * Ex div.

COMPANY NOTICES.

SOUTH SUBURBAN GAS COMPANY.

NOTICE is Hereby Given that the TRANSFER BOOKS relating to the ORDINARY and PREFERENCE STOCKS of this Company WILL BE CLOSED from the 9th July to 22nd July, both days inclusive.

By order of the Board,
T. BROWN,
General Manager and Secretary.

Chief Office,
Lower Sydenham, S.E. 26,
June 24, 1937.

COMMERCIAL GAS COMPANY.

NOTICE is Hereby Given that the TRANSFER BOOKS of this Company, so far as they relate to ORDINARY STOCK, WILL BE CLOSED from the 5th July to 4th August, both days inclusive.

By order of the Board,
E. H. HARMAN,
Secretary.

Offices,
Stepney, E. 1,
June 22, 1937.

TROTTER, HAINES & CORBETT LIMITED
BRETTEL'S ESTATE
FIRE-CLAY & BRICK WORKS
STOURBRIDGE
Manufacturers of GAS RETORTS, GLASSHOUSE FURNACE & BLAST FURNACE BRICKS, LUMPS TILES and every Description of FIRE BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.
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AND REGULATORS
E. E. JEAVONS & CO., LTD.,
Gas Engineers and Mainlayers,
TIPTON, STAFFS.

GAS FIRED AIR HEATERS
AND
HAIR DRYING PLANT
FOR SWIMMING BATHS
LIGHT IN WEIGHT—OCCUPY VERY SMALL SPACE
CONTROLLED FUMIGATION, LTD.,
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THE WORLD'S FINEST
FIRE-PROOF NON-CONDUCTING
material for
GAS PLANT
of every description
J. C. BROADBENT & Co., LTD.
SLAG WOOL WORKS, REDCAR, YORKS
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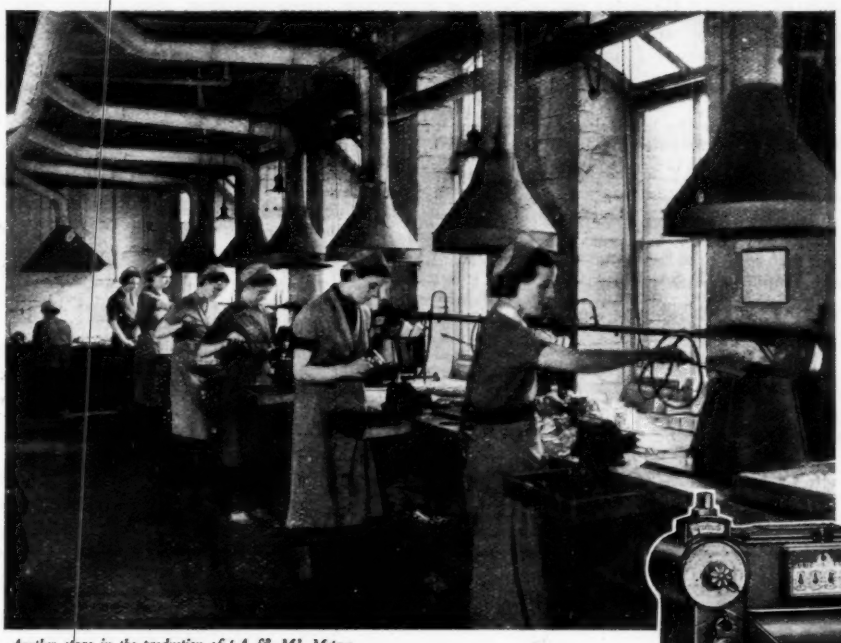
The Uses of Tin



Another stage in the production of 'A & M' Meters.
Girls casting Valve Gratings at Alder & Mackay's Works.

The 'A & M' Optional Meter

THE "Lamb and Flag" Brand, to which we referred in our last advertisement, is so ancient that its origin is lost in antiquity, but as the Lamb has since time immemorial been recognised as a symbol of purity, there is doubtless some connection. It has also been suggested that the introduction of the Flag dates from the time of the Crusaders. And so it seems that in the "Lamb and Flag" we have a symbol of Purity and Excellence, assertive and challenging.

It is of interest to note that the world's supply of Tin does not exceed 150,000 tons annually. It is surprising that this quantity meets the demand. But Tin is seldom used alone.

For solder we mix it with a proportion of Lead. For making Valve Gratings, etc., Antimony is introduced, not only to give the alloy hardness, but also because Antimony has the property of expanding on solidification, and so causes the metal to fill the mould entirely. Gun Metal or Bronze is Tin mixed with Copper. This very hard and durable metal was known to the ancients and has given its name to the Bronze Age. But Bronze was an accidental discovery to these men of 1500/2000 B.C., for they were actually mining Tin with Copper and had no knowledge of how to separate them.

Alder & Mackay Ltd., are manufacturers of Gas Meters for all purposes.

This is the twentieth of a series of talks on the Story of a Gas Meter.

ALDER & MACKAY LTD.

EDINBURGH~LONDON~BRADFORD & BRANCHES

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ESTABLISHED 1873

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MANUFACTURERS and CONTRACTORS for

HANDLING PLANT

SCREENS, TIPPLERS, ETC.

PLANT, &c.

ROBERT DEMPSTER & SONS, LTD., ELLAND, Builders of CARBONIZING PLANTS, both Horizontal and Vertical. Manufacturers of CONDENSERS, PURIFIERS, GASHOLDERS, &c., also every description of COAL and COKE HANDLING PLANT. Telegrams: "DEMPSTER, ELLAND." Telephone: ELLAND 261 (Private Branch Exchange).

FIRTH BLAKELEY, SONS, & CO., LTD., Vulcan Ironworks, Church Fenton, Tadcaster, Yorks.,

MANUFACTURERS of Gas-holders, Tanks, Condensers, Purifiers, Scrubbers, Washers, and every description of Gas Plant.

Sole makers of the "P-M" Semi-water Gas Plant.

Telegrams: "BLAKELEYS, CHURCH FENTON." Telephone: BARKSTON ASH 34 (Private Branch Exchange). Code: "BENTLEYS."

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E. 1.

WET AND DRY GAS METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.

REPAIRS RECEIVE PROMPT ATTENTION.

Telephones: Main (Oldham) 3815/6 and WATerloo 4412, London.

Telegrams: "BRADDOCK, OLDHAM," and "METRIQUE, LAMB, LONDON."

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MEWBURN, ELLIS, & CO.,

CHARTERED PATENT AGENTS

AND TRADE MARK AGENTS,

70 & 72, Chancery Lane, London, W.C. 2.

Telegrams: "Patent, London." 'Phone: 0437 Holborn.

And 3, St. Nicholas Buildings, Newcastle-on-Tyne.

APPOINTMENTS, &c., VACANT.

MANAGER for Research and Development Department Wanted by large Gas Appliances Manufacturers in Dominions. Must have thorough knowledge of Design and Construction of Cookers and Water Heaters.

Write, stating Age, Experience, Salary required, to No. 8,766, "GAS JOURNAL," 11, BOLT COURT, FLEET STREET, E.C. 4.

WANTED—An Outside Superin-TENDENT, to Take Charge, under the Manager, of all Fitting Work, Estimating, Canvassing, &c.

Apply, in writing, stating Experience, Age, and Salary required, and when available, to the undersigned by July 10.

HAROLD GALLEWAY,
Secretary and Manager.

The Whitby Gas Company,
A Constituent Company of the
United Kingdom Gas Corporation, Ltd.,
Gas Offices,
36 & 37, Flowergate,
Whitby,
Yorks.

WANTED—Industrial Gas Sales-MAN to act as Assistant to Experienced Man.

Write, stating Age, Experience, and Salary required, to No. 8,767, "GAS JOURNAL," 11, BOLT COURT, FLEET STREET, E.C. 4.

OXIDE OF IRON.

SPENT OXIDE BOUGHT.

BALE & CHURCH, LTD.,

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Phone: Mansion House 1156.

"TORTO" FIRE CEMENT.

BALE & CHURCH, LTD.,

33, ST. MARY-AT-HILL, LONDON, E.C. 3.
Phone: Mansion House 1156.

"KLEENOFF," THE COOKER CLEANSER

Tins for Sale to Consumers.
In Bulk for Works Use.
(*See also June 2, p. 591, and the "Gas Salesman."*)

BALE & CHURCH, LTD.,

33, ST. MARY-AT-HILL, LONDON, E.C. 3.
Phone: Mansion House 1156.

APPOINTMENTS VACANT.
(*Continued.*)

RURAL DISTRICT COUNCIL OF MILLOM.

GAS MANAGER.

THE Council require the Services of a Young Competent GAS MANAGER under 40 years of Age, to take complete Charge of Works with an output of 42,000,000 Cubic Feet per Annum.

Salary £300 per Annum, rising if services satisfactory by four annual increments of £12 10s. to a maximum of £350 (with Free Gas and 4 Tons of Coal, in no case exceeding £15 per Annum). The successful candidate must reside in Millom in close proximity to the Works. Workshop and necessary Staff provided by the Council.

The Council have adopted a Superannuation Scheme, and this post will be a designated one. The successful candidate will be required to contribute to the Superannuation Fund and pass a Medical Examination.

Applications (in Candidates' own handwriting), together with Two recent Testimonials (copies not returnable), setting out full particulars as to Qualifications, Experience, &c., to be sent in to the undersigned in envelope provided by the Council, marked "Gas Manager," not later than Twelve noon on Monday, 12th July, 1937.

ARTHUR LAWRENCE,
Clerk of the Council.

Council Offices,
Millom,
June 25, 1937.

APPOINTMENTS VACANT.
(Continued.)

WANTED, by a Large Gas Under-taking in the West of England, Two DISTRICT INSPECTORS, capable of taking charge of Fitters and having Practical Experience in Fitting and Estimating Work.

Applications, stating Age, Experience, and Wages required, to be sent, together with *copies* of recent Testimonials, to No. 8,761, "GAS JOURNAL," 11, BOLT COURT, FLEET STREET, E.C. 4.

AN Old-Established and Progres-sive Firm of Gas Appliance Manufacturers has a VACANCY on its Staff for an APPLIANCE DESIGNER. Applicants must have a thorough knowledge of the Technique of Modern Gas Appliance Design, and should be familiar with and competent to carry out the various Tests on Appliances and Component Parts adopted by many Gas Undertakings.

Intending Applicants should write briefly giving details of their Qualifications, Experience, and Salary required to No. 8,768, "GAS JOURNAL," 11, BOLT COURT, FLEET STREET, E.C. 4.

WANTED, by a large Gas Under-taking, a FOREMAN to Take Charge of Workshops for the Renovation and Repair of Gas Cookers, Fires, &c. Applicants must have had suitable Training, Experience in the Control of Men, and preferably experience in a similar capacity. Salary £221, rising to £250 per Annum. State Age, Training and Experience, and give References.

Address, No. 8,765, "GAS JOURNAL," 11, BOLT COURT, FLEET STREET, E.C. 4.

HERNE BAY GAS COMPANY, LIMITED.

APPLICATIONS are invited for the Position of SHOWROOM SALESMAN. Applicants must have had previous Experience and be fully conversant with all Modern Appliances. Salary £175 to £200 per Annum, according to Qualifications.

Applications, endorsed "Showroom Salesman," stating Age, particulars of Experience and Education, together with *copies* of recent Testimonials, to be sent to the undersigned not later than 17th July, 1937.

F. DAWSON,
Engineer and Manager.

Herne Bay Gas Company, Ltd.,
91-95, High Street,
Herne Bay,
Kent.

DRAUGHTSMEN, Senior, with Knowledge of Coal Carbonizing and Gas-Works Practice, Wanted immediately.

Apply, giving full particulars of Experience, Age, and Salary required, to No. 8,763, "GAS JOURNAL," 11, BOLT COURT, FLEET STREET E.C. 4.

DRAUGHTSMEN required imme-diately for Firm of Carbonizing Engineers in London. Experienced in Vertical Retorts and Coke Ovens.

Apply, stating Age and Salary required, to No. 8,764, "GAS JOURNAL," 11, BOLT COURT, FLEET STREET, E.C. 4.

DRAUGHTSMAN required, Ex-perienced in the Design of Gas-Works Plant and/or Mild Steel Structures.

Reply by letter, stating Experience, Age, and Salary required, to NEWTON, CHAMBERS, & CO., LTD., THORNCLIFFE IRONWORKS, Nr. SHEFFIELD.

WANTED—Skilled Fitter or Mill-WRIGHT for General Maintenance of Gas-Works Plant and Machinery. Permanent position to suitable Man.

Reply, stating Experience and Wages required, to the GAS-WORKS, TAUNTON.

PLANT &c. (Second Hand) FOR SALE and WANTED.

ROBERT R. PATON, LTD.

DISMANTLING
COKE OVEN AND BY-PRODUCT PLANTS
AT
BARNSLEY MAIN, WOMBWELL MAIN, AND BARROW BARNSLEY COLLIERIES.
For Disposal.

BENZOLE SCRUBBERS.—Five M.S. Cylindrical. 8 ft. dia. by 32 ft.; 7 ft. 6 in. dia. by 32 ft.; and 6 ft. dia. by 28 ft. $\frac{5}{16}$ in. Plate.

AMMONIA SCRUBBER.—M.S. Cylindrical. 8 ft. dia. by 35 ft. $\frac{5}{16}$ in. Plate.

GAS COOLER.—One Set Vertical Sq. of two Units, each 7 ft. by 7 ft. by 32 ft. 1,000 3 in. Horizontal Tubes. Total Cooling Area, 11,000 sq.ft. All in excellent condition, complete with Connecting Pipes, Valves, &c.

CRUDE BENZOLE PLANT, comprising Stills, Oil Heaters, Heat Exchangers, with Oil Storage Tanks, Pumps, &c.

BENZOLE RECTIFICATION PLANT, comprising Primary and Secondary Stills, Dephlegmators, Condensers, Storage Tanks, Pumps, Air Compressors, &c.

TAR EXTRACTION PLANT, comprising Cyclone, Extractor with Fans, Separators and Catch Pans, Tar Storage Tanks, Pumps, &c.

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CONTRACTS OPEN.

MARPLE URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

GAS PEAS, BEANS, SLACK, &c.

THE above-named Council invite TENDERS for the Supply of GAS PEAS, BEANS, SLACK, &c., as required at their Gas-Works, Marple Bridge, during the Twelve Months ending 31st August, 1938.

Forms of Tender and Conditions upon which Tenders only will be received may be obtained upon application to Mr. J. K. Law, Gas Engineer, Marple Bridge, near Stockport.

Tenders, endorsed "Coals," and addressed to the Chairman of the Stores Committee, to be delivered at the Council Offices, Marple, by Four o'clock in the afternoon on Saturday, the 17th July, 1937.

No Tender will be received except in a plain sealed envelope, which must not bear any name or mark indicating the sender.

The Council do not bind themselves to accept the lowest or any Tender.

JAMES FREEMAN,
Clerk of the Council.

Council Offices,
Marple,
Cheshire,
June 22, 1937.

COUNTY BOROUGH OF WALLASEY.

TENDERS FOR—

(*a*) WATER PUMPING MACHINERY, WATER-WORKS.

(*b*) PURCHASE OF GASHOLDER, GAS-WORKS.

TENDERS are invited for the following:

(*a*) The Supply and Erection of WATER PUMPING MACHINERY, Cast Iron Connections, Electric Motor of about 167 H.P., Automatic Control Equipment, and Cables.

(*b*) The Purchase, Dismantlement, and Removal of all Materials comprising the No. 3 GAS-HOLDER, erected 1885, at the Gas-Works, Wallasey.

Full Particulars and Specifications may be obtained from the Borough Gas and Water Engineer, Gas-Works, Wallasey.

Tenders, in plain sealed envelopes, endorsed either "Water Pumping Machinery" or "Purchase of Gas-Works Material," must be delivered to the undersigned not later than Tuesday, 13th July, 1937.

EMRYS EVANS,
Town Clerk.

Town Hall,
Wallasey.

Continued on next page.

CONTRACTS OPEN.
(Continued.)

BOROUGH OF CHORLEY.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the Supply of 7,000 Tons of WASHED GAS NUTS (Doubles or Singles), to be delivered at the Chorley L.M. & S. Railway Sidings, during the Twelve Months commencing not later than Sept. 1, 1937.

Tender Forms may be obtained from the Gas Engineer, Gas Offices, Water Street, Chorley, and must be returned in plain sealed envelopes, endorsed "Gas Nuts," to the undersigned not later than Monday, July 12, 1937.

GEORGE JACKSON,
Town Clerk.

Town Hall,
Chorley,
June 25, 1937.

BOROUGH OF KEIGHLEY.
(GAS DEPARTMENT.)

TENDERS are invited for the Supply, Delivery, and Erection of an Installation of CONTINUOUS VERTICAL RETORTS, capacity 1½ Million Cu.Ft. per Day, complete with Coke Screening Plant, Coke Storage Bunkers, Waste Heat Boiler, &c.

Specification and Drawing obtainable from F. N. Booth, Engineer and Manager, Corporation Gas Department, Cook Lane, Keighley.

Tenders, in plain sealed envelopes, endorsed "Continuous Verticals," to be received by me not later than first post Monday, July 12th.

The Council do not bind themselves to accept the lowest or any Tender.

S. WALKER,
Town Clerk.

Town Hall,
Keighley.

CONTRACTS OPEN.
(Continued.)

HAVERHILL (SUFFOLK) URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

TENDERS are invited for the Supply of 1,800 Tons of SCREENED GAS COAL or LARGE NUTS, delivered to Haverhill (North) Station, L.N.E. Railway, during the Twelve Months ending July 31, 1938, in such quantities as may be required.

Tenders, sealed and endorsed "Tenders for Gas Coal," to be delivered, addressed to the undersigned, not later than Twelve noon on Wednesday, the 21st day of July, 1937.

No Special Forms of Tender are supplied.

The Council reserve to themselves the right to divide the Tenders or to decline any Tender.

Dated this 28th day of June, 1937.

JAMES BEASLEY,
Clerk to the Council.

29, Queen Street,
Haverhill,
Suffolk.

THE FLEETWOOD GAS COMPANY.

TENDERS are invited for the Delivery over Twelve Months of 5,000 Tons of GAS SCREENED COAL, WASHED DOUBLES, WASHED SINGLES, or ROUGH SLACK at Fleetwood L.M.S. Sidings.

Tenders, endorsed "Coal," to be in my possession by July 1st, 1937.

W. P. SMITH,
Engineer and Manager.

Gas Offices,
168, Lord Street,
Fleetwood.

CONTRACTS OPEN.
(Continued.)

SUTTON-IN-ASHFIELD URBAN DISTRICT COUNCIL.
(WATERWORKS DEPARTMENT.)

WATER PRESSURE BOOSTING TO HIGH LEVEL ZONES.

THE Council are open to receive TENDERS for the Manufacture, Supply, Erection on Foundations to be provided by the Council, and Setting to Work Complete, of Two ELECTRICALLY DRIVEN TURBINE BOOSTER PUMPS, ELECTRIC MOTORS, AIR COMPRESSION TANK, ELECTRICALLY DRIVEN AIR COMPRESSOR, AUTOMATICALLY OPERATED ELECTRICAL CONTROL GEAR, WIRING, CAST IRON PIPES and CONNECTIONS, and other Works Ancillary thereto.

Contract Conditions, Specification, and Form of Tender, together with such further information as may be necessary, may be obtained from the Waterworks Manager to the Council, Mr. J. J. Merrell, M.Inst.Gas E., Fox Street, Sutton-in-Ashfield, on deposit of a cheque value £2 2s., which sum will be returnable on receipt of a *bona-fide* Tender, and the return of the Documents.

Sealed Tenders, endorsed "Water Boosting Plant," must be received at the Office of the undersigned not later than the 5th July, 1937.

The Council do not bind themselves to accept the lowest or any Tender.

By order,
LUTHER PEPPER,
Clerk to the Council.

Portland Square,
Sutton-in-Ashfield,
June 17, 1937.

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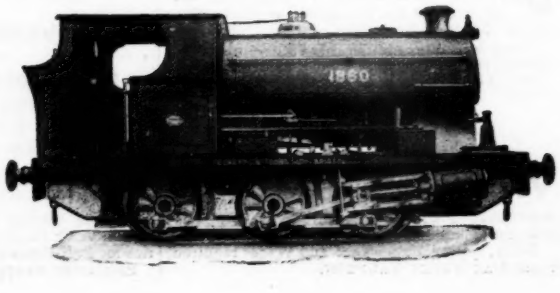

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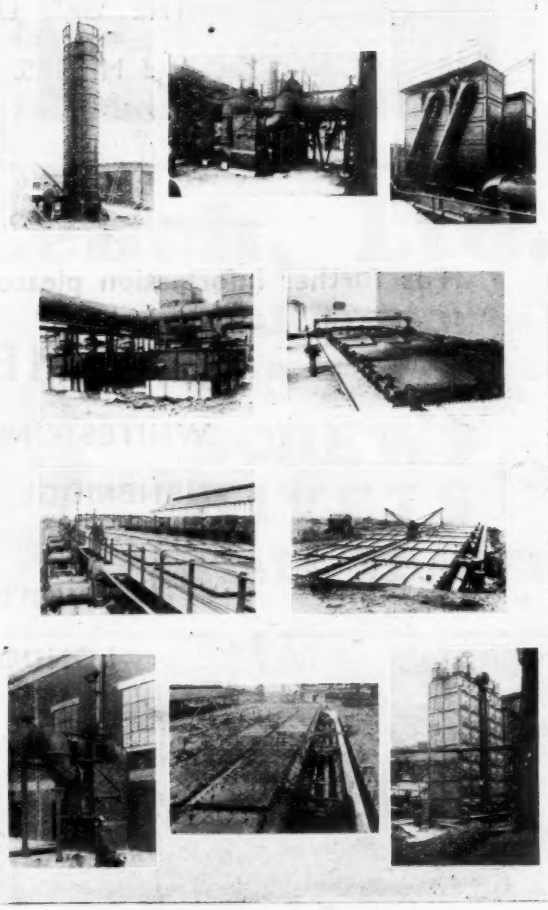

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